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ABSTRACT

Designed to help educators of health and medical personnel to increase their own skills so as to make learning easier for their students, this handbook contains information and activities to help teachers define the professional tasks that will provide the basis for determining educational objectives, plan a curriculum, and construct tests and other measurement devices. In a discussion of educational objectives the following topics are covered: importance of defining professional tasks, selection of training goals, examples of services provided by rural health units, types of educational objectives, and identifying the components of a task. Described in a section on evaluation planning are the nature of evaluation, selecting an evaluation method, formative and certifying evaluation, aims of student evaluation, and organizing an evaluation system. Various aspects of program construction are covered, including curriculum planning principles, aims and methods of teaching, integrated teaching and learning, and use of specification tables. Addressed next are reasons and guidelines for implementing various test and measurement techniques. Suggestions are provided for organizing an educational workshop. A glossary, index, and bibliography conclude the handbook. (MN)

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EDUCATIONAL HANDBOOK FOR HEALTH PERSONNEL

A REVISED EDITION

World Health Organization
Geneva 1981

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Educational Handbook for Health Personnel

How to help educators to increase their skills so as to make learning easier for the students

1981

objectives of the handbook

When you have studied this handbook you should be able to:

- define the professional tasks which will provide the basis for determining educational objectives
- plan a curriculum
- construct tests and other measurement devices.

These skills will be based upon a measurable gain of knowledge concerning:

- relationship between professional training programmes and subsequent practice;
- principles of learning and role of the teacher;
- role of objectives in educational planning;
- principles and methods of curriculum planning;
- principles and practice of educational evaluation.

You will also have strengthened your desire to go on learning and acquiring skills in education and will have mastered an effective way of setting about it.

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preface to the fifth edition

This fifth edition (1981) is a fairly substantial revision, featuring in particular more concrete examples and more exercises than the 1977 edition. It is a collective work taking into account the critical comments and suggestions of numerous users of the earlier editions and the results of a survey carried out among 200 selected readers, whom we take this opportunity of thanking.

The first edition was prepared on the basis of documents distributed during a workshop organized by the Regional Office for Africa, Brazzaville, in December 1969 with the assistance of consultants in medical education.[1] It has been widely used in the Region and served as a basic document for many educational planning workshops.

It then became evident that it would be useful to give the reader better guidance during his progression through the whole educational planning cycle. Although this objective would most likely be achieved by a completely programmed presentation it seemed that the complexity of the problems involved was not great enough to justify a method which would be so intricate and long to prepare. Only practice could say whether this was correct. In 1975 a fully revised text was field tested and led to the 1976 revision distributed in over 10,000 copies in four languages. The 1977 edition was translated into 11 languages as a result of national initiatives. It too was used at many "educational workshops", during which interesting and constructuve criticism was expressed to the same effect as the comments received from the readers participating in the survey, who included many experienced educators: need for greater clarity (less jargon), more concrete examples and more practical exercises.

An attempt has been made in this fifth (1981) edition to take this advice into account.

Like the previous ones, this new edition will be revised in its turn, in the light of the suggestions we hope to receive from users. To order copies in French or English, please see the list of addresses on the back cover. For editions in other languages, or ***if you would like further information or explanations***, do not hesitate to write to:

J.-J. Guilbert, M.D., Ph.D.(Educ.)
Chief, Educational Planning and Methodology
Division of Health Manpower Development
World Health Organization
1211 Geneva 27
Switzerland

Your suggestions will always be welcome. There is a special sheet you can use for them at the end of this handbook.

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[1] Dr. S. Abrahamson and Dr. H. Peterson (USC, Dept. Med. Educ., Los Angeles).

WORLD HEALTH ORGANIZATION ORGANISATION MONDIALE DE LA SANTE

Dear Colleagues,

In our common struggle to achieve the objective of "Health for all by the year 2000", the place of basic training and continuous education of health personnel is a crucial one.

The Conference of Alma-Ata recommended, among other things, that governments "[define] the technical role, supportive skills, and attitudes required for every category of health worker according to the functions that need to be carried out to ensure effective primary health care...". It also recommended that "health workers, especially physicians and nurses, should be socially and technically trained and motivated to serve the community; that all training should include field activities", and that due attention should be paid to the preparation of teachers of health workers.

All these reasons lead me to regard the publication of this revised edition of the ***Educational Handbook for Health Personnel*** as particularly useful, in that it will facilitate the application of those recommendations.

It is also a practical example of the technical support that an international organization such as ours must offer to back up national efforts in favour of primary health care.

Of course it is only one element among many; a small stone that helps pave the difficult way to health for all.

I hope this Handbook will continue to meet with the success it has enjoyed for over 10 years among its many users.

Dr. H. Mahler
Director-General

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for whom is this educational handbook intended?

Originally, in 1969, the first edition was written *for teachers* of the health sciences. Subsequently, however, the Handbook was used above all by hundreds of participants in meetings organized by WHO or held with WHO assistance (educational planning workshops, teaching methodology seminars, etc.......).

A survey of 200 users carried out in 1975 revealed the following opinions.

A very small minority (10%) felt that the Handbook should be supplied only to participants in controlled educational activities (workshops, seminars, courses, etc.) or reserved for "teachers of teachers". ***The majority, however, felt that dissemination should be as wide as possible***, and be directed to all teachers of health sciences at all levels, to health administrators with staff supervision responsibilities, ***and to students***, so as to help them to draw maximum benefit from their learning activities and participate in their organization. The latest poll, conducted in 1978, produced very apposite comments from about 100 users in all parts of the world and the consensus is still in favour of the widest possible distribution. Many teachers of the various health professions (dentists, nurses, sanitary engineers, physicians, pharmacists, etc.) have stated that the Handbook answers their needs, but some think that the author's training as a physician has still too often biased the choice of examples. A further effort has been made with this 1981 edition to produce a text better suited to ***everyone*** working in the health professions. It is, however, very difficult to strike a perfect balance, for many reasons. While it is still true that most of the examples relate to the medical and nursing professions, it is the author's hope that each user of the Handbook will make a personal effort at ***adaptation***, replacing the examples given by other more suitable ones whenever necessary.

jargon and meaning of words

Many users of the previous editions have asked for special care to be taken to simplify the language used. We hope they will be satisfied. It has not, however, been possible to avoid using certain technical terms (for example: discrimination index). Neither has it been possible to avoid assigning precise and restricted meanings to words which are often used interchangeably in everyday parlance (for example: task, activity and function). In all such cases the words are defined in the Glossary (p.6.01 *et. seq.*).

It is very important that we should understand one another, and for that we must give identical meanings to the words we use. But it is just as important not to get bogged down in endless discussions. Your aim is not to draft definitions of words for a dictionary.

So please accept the definitions proposed in this Handbook, at least while you are using it.

how to use the handbook

The presentation and layout of this Handbook are unusual.

- It should be stressed at this point that the approaches suggested in this book are the result of a deliberate choice by the author and reflect his ideas in the field of education. Various theories sometimes regarded as contradictory are explained to the reader so as to give him food for reflection, rather than to subject him to any philosophical constraint. It is for the reader to make his choice, to draw initial conclusions and, in particular, to seek solutions for his own teaching problems by taking what is worth using among the various theoretical approaches suggested. To reject them wholesale would hardly be constructive; it would be preferable to propose better ones.

- For each chapter a list of objectives is included (yellow pages) to give you an idea of what you will get out of the chapter.

  The theoretical input (white pages) is presented in the form of original documents or short quotations from texts listed in the bibliography.

  All through the Handbook there are exercises (blue pages) to help you to determine whether you have increased your skills (see check list, page 15).

  Certain documents are printed in large type so that they can be easily made into transparencies for use with an overhead projector (see technique on page 3.45).

- The page numbering is also unorthodox: every chapter begins with a number ending in 01 (for example page 3.01 is the first page of the third chapter), however many pages there may be in the previous chapter. This meakes it easier to find a specific passage in the Handbook.

  Rather than try to explain the whys and wherefores of this unusual layout, which some find irritating and complicated at first, and others as intriguing as a detective story, it seems simpler to invite you to use this book just as it is. You will then draw your own conclusions as to the "reasons" for its layout. There must be some... even if the author is not aware of them all!

In any case you are warned not to *read* this Handbook like a conventional book, starting with the first page and hoping to get to the last. It is meant to be used as determined by the questions you put to yourself, your needs, and the teaching problems that bother you – by your own objectives, in short, whether or not they are already articulated.

This is why we are going to try and help you in this essential but unusual and therefore difficult undertaking.

- First situation: you are alone (on a desert island) or else you are accustomed and prefer to work alone. You are going to need grit, perseverance and 35 to 50 hours of free time.

  Good Luck!

- Second situation: a colleague also has the Handbook and agrees to work with you. It will not be such an uphill task. If you can get together a small working group of five persons, still better.

- Third situation: you are taking part in an educational workshop. The working methods for such a meeting are described in this Handbook (pp. 5.10 – 5.12) and group dynamics will do the rest.

In any case, the first thing to do is *to identify your needs.*

You are invited to proceed in three stages.

identification of your needs as an educator

First Stage

- What are the educational "questions" that you would like to have answered? (For example: "what is an educational objective?", "what does the word 'validity' mean with reference to an examination?").
- What are the educational "tasks" that you would like to take on? (For example: "organizing a nutrition course for student nurses" or "teaching how to interview a patient").
- What are the educational "problems" you would like to solve? (For example: "I am in charge of 600 students in different university years: how am I to organize field work in preventive medicine?"

Now .... Try to draw up a preliminary list of your "questions", "educational tasks" or "problems" for the coming 12-month period.

EXERCISE

identification of your needs as an educator

Second stage

Would you like to find out how much you know *before* studying the rest of the Handbook? One way of doing this is to try to answer the questions in a *pre-test**.

To do so, read *straight away* the questions on pages 1.57 – 1.60, 2.45 – 2.47, 3.79 – 3.83 and 4.75 – 4.80 and enter your answers on the answer sheet, page 10.

If your score is low in this pre-test, this should be a source of satisfaction, for it may show that you were right to start perusing this Handbook and that it will be worth your while continuing so that you can improve your weak spots.

The test will help you make a personal diagnosis of the teaching areas you need to bring up to date. Your aim in doing this test is not to find the right answer but *simply to take note of the fact that you do not find it!*

You may also rest assured that your score in the *post-test* (page 5.34) will be another occasion for satisfaction for it will show an appreciable gain after you have used the Handbook.

If your score in the pre-test is high, you should choose areas which are still "uncertain" (those for which you did not find the correct answer) and go into the matter more thoroughly.

---

*This pre-test deals only with theoretical knowledge relating to group 2, page 2. You will have an opportunity of gauging how far you have achieved the group 1 objectives by doing other exercises which appear throughout the Handbook (blue pages).

answer sheet for pre-test*

Chapter I

1 A B C D E
2 A B C D E
3 A B C D E
4 A B C D E
5 A B C D E
6 A B C D E
7 A B C D E
8 A B C D E
9 A B C D E
10 A B C D E
11 A B C D E
12 A B C D E
13 A B C D E
14 A B C D E
15 A B C D E F G
16 A B C D E F G
17 A B C D E F G
18 A B C D E F G
19 A B C D E F G
20 A B C D E F G

Chapter II

1 ______________________
____
____
____

2 A B C D E
3 A B C D E
4 A B C D
5 A B C D
6 A B C D
7 A B C D
8 A B C D
9 C CF
10 C CF
11 C CF
12 C CF
13 C CF
14 C CF
15 C CF
16 C CF
17 ______________________
____
____
____
____

18 A B C D E
19 A B C D E
20 A B C D E
21 A B C D
22 A B C D E
23 A B C D E
24 A B C D E
25 A B C D E

Chapter III

1 A B C D E
2 A B C D E
3 A B C D E
4 A B C
5 A B C
6 A B C
7 A B C
8 A B C D E
9 A B C D E
10 A B C D
11 A B C D
12 A B C D
13 A B C D
14 A B C D
15 A B C D
16 A B C D
17 A B C D
18 A B C D
19 A B C D
20 A B C D

Chapter IV

1 A B C D E
2 A B C D E
3 A B C D E
4 A B C D E
5 A B C D E
6 A B C D E
7 A B C D
8 A B C D
9 A B C D
10 A B C D E
11 A B C D
12 A B C D
13 A B C D
14 A B C D
15 A B C D
16 A B C D
17 A B C D E
18 A B C D E
19 A B C D E
20 A B C D

---

*see page 9

To check your raw score compare your answers with those given on page 5.34.

identification of your needs as an educator

Third stage

To use this Handbook effectively for your own needs, it is proposed that *you* choose from among the following educational tasks or objectives (broken down into four main themes) the ones which interest *you* and in which you would like to achieve a degree of competence.

The time required for personal work (study of the text, practical exercises) on some of these tasks will be more or less long. Some call for a few minutes' work, others several hours to allow for study of the documents suggested (p.14).

To guide you in this first choice, do not forget to take into account the "questions and problems" you listed on p.8 and your weak and strong points (results of pre-test, p. 5.34).

Limit this initial choice to ***about 10*** tasks, circling the numbers of those that seem most important for you on the list (numbered 1 – 40) appearing on pages 12 – 13.

It is natural that you should have some difficulty in making your choice at this stage, for you are not yet familiar with "educators' jargon". Do not forget the Glossary (pp.6.01 *et seq.*) Don't worry .... in any case there is no risk involved!

Moreover, you can always adjust your choice as your work progresses.

Once your initial choice has been made, turn to p. 14 and follow the instructions given there: study the suggested pages and do the corresponding exercises (blue pages.)

educational objectives 1

1. Define the following terms: professional task, activities, functions, role, institutional objective; specific objective; domains of practical skills; communication skills and intellectual skills.

2. List the qualities of an educational objective and the sources necessary to ensure its relevance.

3. Define the professional functions of a member of the health team whom your teaching institution is responsible for training (*general* educational objectives) so as to deal with the health problems of society.*

4. Analyse a major professional function by defining the various ***intermediate*** components (activities) making it up.*

5. Define a professional task and identify its components (domains of practical skills, communication skills and intellectual skills).

6. Draw up a list of the ***specific*** educational objectives relating to a professional task, stating explicitly what you feel the student should be able to "do" after a given course of instruction (that he was not able to do previously) and corresponding to the domains of the communication skills or practical skills involved in this activity.*

7. Taking a specific objective in a non-cognitive domain (i.e. practical or communication skills), define in the form of specific educational objectives what theoretical ***knowledge*** you feel the student should possess if he is to attain that objective.*

8. Make a critical analysis of specific educational objectives (listed by a colleague), indicating in particular whether they include all the requisite elements (act, content, condition, criteria).*

9. Draw up a list of the possible reactions of colleagues in your faculty to the idea of having to define educational objectives derived from professional tasks and propose strategies for overcoming those reactions.*

evaluation planning 2

10. Draw a diagram showing the relationship between evaluation and the other parts of the educational process.

11. Define the principal role of evaluation, its purpose and its aims.

12. Describe the difference between formative and certifying evaluation.

13. List the good and bad features of a test.

14. Compare the advantages and disadvantages of tests in current use.

15. Define the following terms: validity, reliability, objectivity, and describe the relationship that exists between them.

16. Choose an appropriate evaluation method (questionnaire, written examination, "objective" test (MCQ or short, open-answer question) or essay question, oral examination, direct observation, etc.) for measuring the students' attainment of a specific educational objective. Compare the alternatives in a specification table.*

17. Define (in the form of an organizational diagram) the organization of an evaluation system suitable for your establishment, and list the stages involved.

    Indicate:

    (a) the most important educational decisions you have to take;

    (b) the data to be collected to provide a basis for those decisions;

    (c) the aims of the system and subsystems in terms of decisions to be taken and the object of each decision (teachers, students, programmes).*

18. Identify obstacles to and strategies for improvement of a system of evaluating students, teachers and programmes.*

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* See footnote, p. 5.19.

programme construction 3

19. Explain the differences between "education", "teaching" and "learning", and describe the new trends in the teaching/learning system and the various learning situations.

20. Define the concept of relevance of a programme.

21. List 10 conditions which facilitate learning and evaluate a learning activity.

22. Indicate the aims and general methods of teaching.

23. Specify at least two advantages and two disadvantages for each technique and medium used in teaching.

24. Select a teaching method that will make an educational objective easier to achieve.

    Compare the alternatives in a specification table.*

25. Indicate the steps involved in constructing a programme.

26. Construct a programme or decide whether a programme or course needs revision, using a specification table.*

27. Construct a self-learning package.*

28. Define the role which, as a teacher, you would like to assume in order to motivate and facilitate the learning of students for whom you are responsible.*

29. Identify the obstacles liable to be encountered in setting up a competency based curriculum geared to the health needs of the community and describe strategies for overcoming them.*

implementation of evaluation 4

30. Indicate the different elements that should be considered in the evaluation of a teaching programme.

31. Indicate the different elements that should be considered in the evaluation of the educational objectives of a teaching programme.

32. Define the advantages and limitations of a system of evaluation of teaching *by* the students.*

33. Contruct an observational rating scale and/or a practical test to evaluate the behaviour of a student in the domain of communication and/or practical skills.*

34. Propose a question for a written (open-book) examination of the "essay" type or a series of six short, open-answer questions and indicate the norms of performance permitting objective marking (marking table).*

35. Draw up three multiple choice questions (MCQ) in the domain of intellectual skills – at least two of the objectives must measure an intellectual process superior to level 1 "simple recall" (either level 2 "interpretation of data" or level 3 "problem-solving").*

36. Indicate the advantages and limitations of a programmed examination.*

37. Define the following terms: prerequisite level test, pre-test, interval test, comprehensive pre-final; indicate their purpose and the stages at which they are set.

38. Explain the difference between a ***relative*** and an ***absolute*** criteria test.

39. Calculate the acceptable pass level for a MCQ examination and establish the scoring criteria and norms which permit determination of the passing grade of a mini-test (made up of the questions mentioned in objectives 34 and 35).*

40. Do an item analysis of a question (calculate the difficulty index and the discrimination index) and draw the relevant conclusions.

Theoretical background that will help you reach the educational objectives of the workshop

For objective	Study the following pages of the Educational Handbook	For objective	Study the following pages of the Educational Handbook
1	Glossary and pp. 1.05–1.07, 1.17, 1.23, 1.29, 1.33–1.36	21	pp. 3.28, 3.29
2	pp. 1.20, 1.33, 1.43–1.45, 1.48–1.50	22	pp. 3.21, 3.22
3	Obj. 1 and pp. 1.09–1.27	23	pp. 3.41–3.47
4	Obj. 3 and pp. 1.29–1.32	24	Obj. 6, Obj. 23 and pp. 3.22, 3.23, 3.55–3.58
5	pp. 1.17–1.19, 1.33–1.41	25	pp. 3.03–3.15
6	Obj. 2, Obj. 5 and pp. 1.43–1.53, 1.56	26	Obj. 25 and pp. 3.59–3.75 or pp. 1.27, 3.73, 4.04
7	Obj. 6 and pp. 1.54–1.56	27	Obj. 16, Obj. 24 and pp. 3.49–3.54
8	Obj. 6 and p. 1.56	28	Obj. 20 and pp. 3.33–3.40
9	Obj. [illegible] and pp. 1.63, 3.71, 3.75	29	Obj. 28 and/or Obj. 26 and pp. 3.71, 3.75–3.78
10	pp. 2.03–2.05	30	pp. 4.03–4.09
11	pp. 2.02–2.14, 2.19	31	pp. 4.10–4.14
12	pp. 2.15–2.18	32	pp. 4.15–4.19
13	pp. 2.26–2.29	33	Obj. 16 and pp. 4.22–4.27
14	pp. 2.30 and 2.31	34	Obj. 16 and pp. 4.28–4.30
15	pp. 2.33–2.37	35	Obj. 16 and pp. 4.31–4.40
16	Obj. 6 and pp. 2.21–2.23, 2.27, 2.38	36	pp. 4.41–4.48
17	Obj. 11 and pp. 2.40–2.43	37	pp. 4.49–4.53
18	Obj. 17 and pp. 2.44, 3.71 3.75	38	p. 4.61
19	pp. 1.04, 3.18–3.29	39	Obj. 35, Obj. 38 and pp. 4.62, 4.63
20	pp. 1.33, 3.04–3.12	40	pp. 4.65–4.73

. . . and do the corresponding exercises (blue pages): see list on next page.

Recapitulative table of exercises proposed in Handbook

Objective	Exercise	Page
3	Identifying professional activities	1.15
3	Defining the main functions of health personnel	1.23/1.24
20/26	Analysis of the relevance of a programme	1.27
5	Identifying components of a professional task	1.41
6	Selecting active verbs relating to a task	1.47
8	Identifying the elements of an educational objective	1.51
8	Evaluating an educational objective	1.52
6	Drawing up specific educational objectives	1.54
7	Drawing up enabling educational objectives	1.55
8	Critical analysis of an educational objective	1.56
1/11	Evaluation of knowledge about educational objectives	1.57/1.60
17	Statement of educational decisions	2.09
12	Distinguishing between formative evaluation and certifying evaluation	2.16/2.19
13,14,16	Selecting a method of evaluation	2.23
15,16	Comparing several methods of evaluation	2.38
17	Graphic representation of an evaluation system	2.43
18	Identifying obstacles to and strategies for applying an evaluation system	2.44
10/18	Evaluation of knowledge about evaluation planning	2.45/2.47
19	Describing learning situations	3.29
28	Describing the teacher's functions	3.39
24	Selecting a teaching method	3.57
24	Comparing several teaching methods	3.58
29	Constructing an organizational chart for programme implementation	3.77
29	Identifying obstacles to and strategies for introducing a new programme	3.78
19/29	Evaluation of knowledge about programme construction	3.79/3.83
32	Listing advantages and limitations of evaluation *by* students	4.19
33	Drawing up a practical test or project test	4.22
33	Constructing an attitude table	4.25
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educational objectives

1

the concept of educational objectives

The aims of this first chapter are to show the advantages of defining educational objectives; to show that if precision and clarity of educational objectives are important, relevance to health problems is even more so; and to show that an approach based on objectives will ensure that health personnel are better prepared to perform professional tasks corresponding to the health problems of society.

Those interested in this approach should read the following works by R.F. Mager.

- Preparing instructional objectives (1962).
- Goal analysis (1972).
- Measuring instructional intent (1973) (Chapter III, pages 15 to 46) Fearon Publishers, California, U.S.A.

And the following publication by the World Health Organization.

- Criteria for the evaluation of objectives in the education of health personnel, WHO, Technical Report Series, 1977, No. 608.

After having studied this chapter and the reference documents mentioned you should be able to:

1. Define the following terms: professional task, activities, functions, role, institutional objectives; specific objective; domains of practical skills, communication skills and intellectual skills.

2. List the qualities of an educational objective and the sources necessary to ensure its relevance.

3. Define the professional functions of a member of the health team whom your teaching institution is responsible for training (*general* educational objectives) so as to deal with the health problems of society.

4. Analyse a major professional function by defining the various *intermediate* components (activities) making it up.

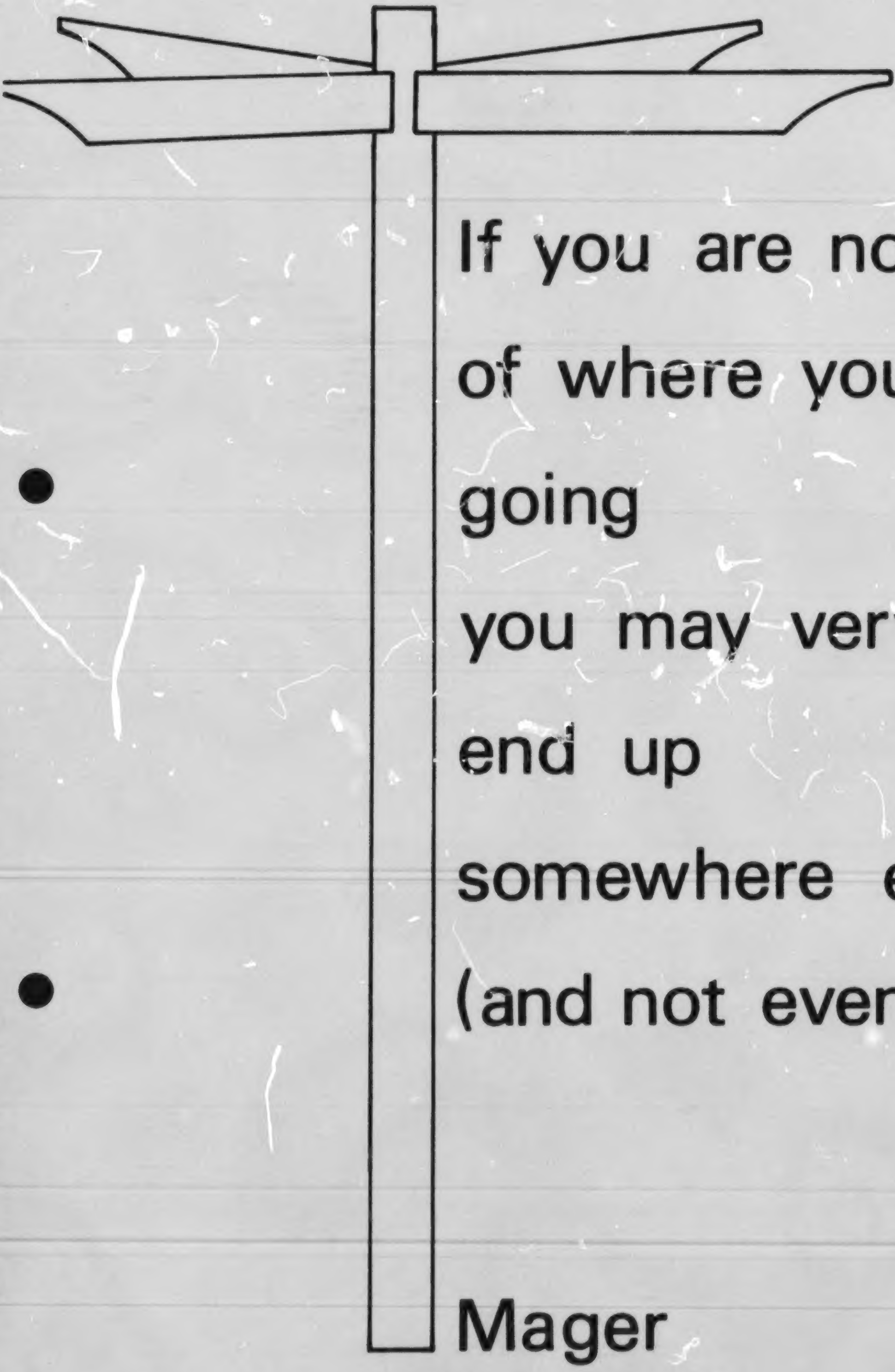
5. Define a professional task and identify its components (domains of practical skills, communication skills and intellectual skills).

6. Draw up a list of the *specific* educational objectives relating to a professional task, stating explicitly what you feel the student should be able to "do" after a given course of instruction (that he was not able to do previously) and corresponding to the domains of the communication skills or practical skills involved in this activity.

7. Taking a specific objective in a non-cognitive domain (i.e., practical or communicative skills), define in terms of specific educational objectives what theoretical *knowledge* you feel the student should possess if he is to attain that objective.

8. Make a critical analysis of specific educational objectives (listed by a colleague), indicating in particular whether they include all the requisite elements (act, content, condition, criteria).

9. Draw up a list of the possible reactions of colleagues with whom you work in your faculty to the idea of having to define educational objectives derived from professional tasks and propose strategies for overcoming those reactions.



If you are not certain
of where you are
going
you may very well
end up
somewhere else
(and not even know it)

Mager

1.03

Every individual should have access to a type of education that permits maximum development of his potential and capabilities.

Education is a **process**, the chief goal of which is to bring about change in human behaviour

The result of education is
an expected change in the behaviour of the student in the course of a given period.

The Educational Spiral

- This "behaviour" will be defined explicitly in the form of educational *objectives* derived from professional tasks.
- An *evaluation* system will be planned so that better educational decisions can be taken.
- A *programme* will be prepared and implemented to facilitate attainment of educational objectives by the students.
- *The evaluation process* will be used to measure the extent to which the objectives have been achieved . . . it will measure the student's *final abilities* . . . and the effectiveness of programme and teachers.

the educational spiral

Programme reform has been a source of concern for many years to those training health personnel and the alarm has often been sounded. However, the strength of the traditions impeding necessary reforms has been such that it has not been possible to avoid serious disturbance in many universities throughout the world, always caused by a reaction in face of the apparent diehard conservatism of the system.

It would, however, be negative and dangerous merely to accuse of incompetence those at present in positions of teaching responsibility. They should be offered help.

Societies change and have always been changing, but until the present century their evolution was relatively slow and adaptation to change was possible without unduly violent disorders.

The form of teaching has remained unchanged for centuries. The university has wrapped itself in its privileges and remained deaf to the cry from without. The needs of society, the practical side of the matter, have been left to chance, whereas specific features of the situation in each country are changing ever more rapidly. Hitherto, unfortunately, little or no account has been taken of those features and the training of health personnel has followed traditional systems. What is required now is to make sure that educational programmes are relevant.

There can be no question of continuing to copy the models of the past or, in the case of developing countries, foreign models.

The educational system leading to the development of health personnel, at all levels, must be re-examined within the context of the needs of the country concerned.[1]

No educational system can be effective unless its purposes are clearly defined. The members of the health team ***must be trained specifically for the tasks they will have to perform***, taking into account the circumstances under which they will work.

These tasks can only be defined ***in accordance with a plan*** in which the nature of the services to be provided is specified, priorities are allotted, the staff needed to provide these services determined, etc. . . . .

Professional training programmes must then be tailored to meet these needs.

There is room for some degree of optimism in this sphere, for no financial assistance is needed for a move in the right direction. All that is needed is a resource distributed more or less equally around the world: mental ability. The management of that resource is the art of organizing talent and of coping intelligently with change.

Defining the ***professional tasks*** of health personnel to be trained, the very basis of the educational objectives of training centres, is of crucial importance.

Thus an educational ***programme***, instead of being the result of a non-selective accumulation of knowledge built up over the centuries, must be shaped selectively ***in terms of the goal to be achieved.*** If that goal is modified in the course of time, the programme must also be modified accordingly.

Definition of professional tasks must proceed from a study of needs, take account of available resources and indicate clearly and precisely what various categories of personnel will be called upon to do during their professional careers in a given type of health service.

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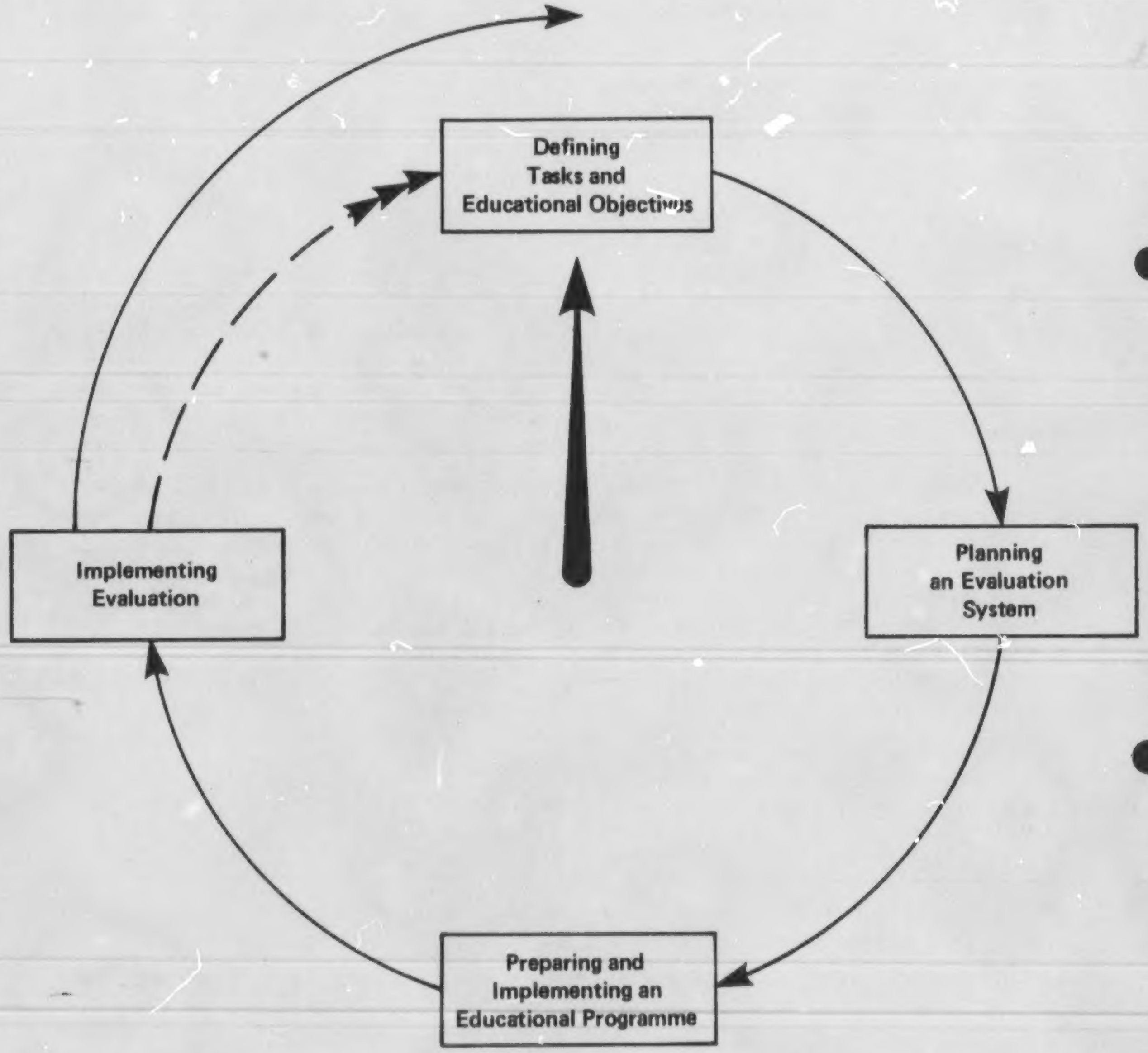
[1] The study of needs, organization of health services, and definition of tasks and functions are, however, not dealt with in this Handbook. Consequently, specialized texts should be consulted concerning those aspects (see Bibliography, p. 7.01).

the educational spiral


Defining Tasks and Educational Objectives
Planning an Evaluation System
Preparing and Implementing an Educational Programme
Implementing Evaluation

1.06

importance of defining professional tasks

If we stress the importance of the prior definition of professional tasks, it is because this is a precondition for ensuring that training programmes are really designed to meet the population's health needs. Over the last 10 years or so teachers, under the cloak of an educational revival, have used the title of educational objectives to disguise what they had been in the habit of teaching in the past. Such educational objectives have favoured the creation or continuation of training programmes which only too often seem hardly relevant to the needs of the population.

Indeed, if educational objectives are based on faulty principles, then the "best" system of training may well give "bad" results. There is even a danger that a "bad" message will be "better" communicated, and this is certainly not the goal sought.

We therefore propose to demonstrate that the ***professional tasks*** of a member of the health team and the ***educational objectives*** providing a basis for construction of his training programme must be almost identical.

Another important point to bear in mind is that it can be useless to try to change a programme or teaching methods without also changing the system of evaluation (particularly examinations). Experience has shown that if, on the other hand, the evaluation system is modified, this has a much greater impact on the nature of learning than has modification of the programme unaccompanied by any change in the evaluation system. Evaluation provides a sound basis for programme planning. Therefore, an evaluation mechanism should be set up ***before*** proceeding to any reform of the programme. This makes it possible to measure the level at the outset (prerequisite level) and the level at the finish and thus to determine whether the change has been positive or not. This process can be represented by what is called the ***educational spiral***.

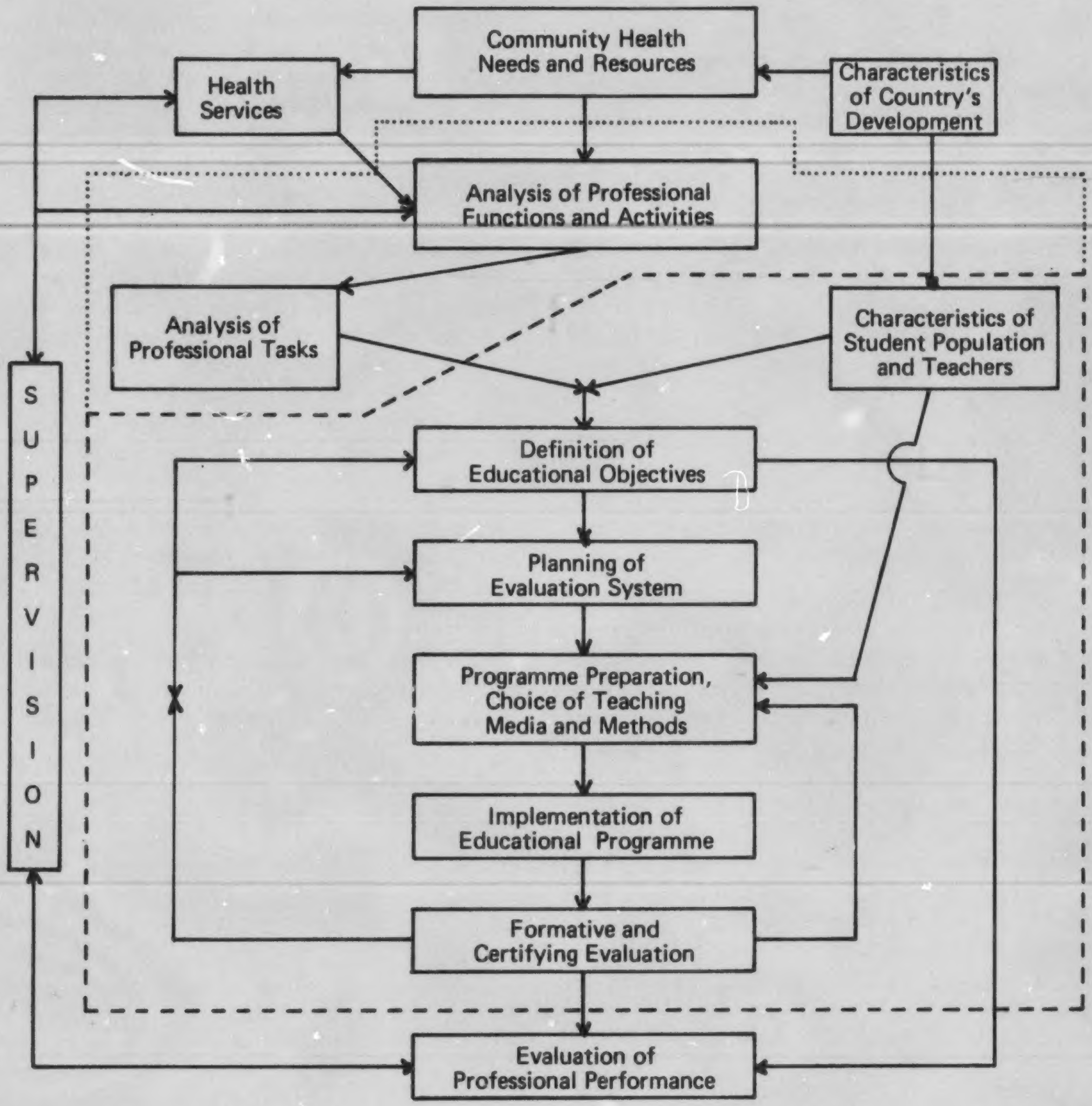
If the teaching staff are given an opportunity to gain the new knowledge they need and to acquire the appropriate modern teaching skills, they will feel more secure and instead of being confined to limited personal experience they will accept the use of more formal educational research methods.

This can be a powerful stimulus for institutional change, particularly when used by faculty members whose experience in the educational process has already alerted them to the ways in which educational innovation can be accomplished with the greatest possible enthusiasm and the least possible hostility on the part of their colleagues. Such innovation, based upon carefully gathered information and developed according to sound educational principles, could enable some medical education institutions to explore, in particular, non-traditional means of preparing the members of the health team for the professional tasks they will have to undertake. Without the incrusted educational tradition that long adherence to a single system creates, the opportunity for innovative experimentation is far greater.

This is a very difficult task which may well have daunted the most conscientious. We consider that teachers should be offered assistance in this field.

That is the main reason why this Handbook has been prepared and used during workshops on educational planning.

Organizational diagram showing the relationship between the subsystem "Education" (inside the dotted line) and the subsystem "Health Service".


Community Health Needs and Resources
Health Services
Characteristics of Country's Development
Analysis of Professional Functions and Activities
Analysis of Professional Tasks
Characteristics of Student Population and Teachers
SUPERVISION
Definition of Educational Objectives
Planning of Evaluation System
Programme Preparation, Choice of Teaching Media and Methods
Implementation of Educational Programme
Formative and Certifying Evaluation
Evaluation of Professional Performance

selection of training goals[1]

Traditionally, this selection has been made by relying on the judgment of experts to determine what a neophyte in the profession ought to know and ought to be able to do. In the past we have relied almost exclusively on this method. As a result curricula are crammed with an ever-burgeoning amount of new and highly specialized knowledge which the student perceives as irrelevant to his own goals and which, in fact, may be of little value to other than the super sub-specialist. Certainly expert opinion is an important source of information about the knowledge and skills which trainees should be able to demonstrate, but it is also possible to make this decision on the basis of scientific evidence about what competent health personnel need to know and need to be able to do in order to fulfil their responsibilities. A number of procedures have now been developed for collecting such data which provide an empirical basis for working out a behavioural description of the essential components of professional competence. This is of great assistance to faculties in setting goals and designing curricula. Three of these procedures are of special interest: the critical incident technique, the method of task analysis and the method of analysis of epidemiological data.

The critical incident technique

This method consists in collecting data about specific types of behaviour that characterize professional effectiveness and ineffectiveness and using these data to make an objective, empirical assessment of the essential performance requirements of the profession. This technique is an outgrowth of studies in aviation psychology made in the United States during World War II. In that programme it was found that in reporting the reasons for eliminating a trainee, pilot instructors and check pilots frequently offered such cliches and stereotypes as "lack of inherent flying ability", "poor judgment" or "unsuitable temperament". In an effort to determine the specific characteristics of personnel that contributed to success or failure, combat veterans were asked to report incidents observed by them that involved *behaviour which was especially helpful* or especially inadequate in accomplishing the assigned mission. This request concluded with the statement: "Describe the officer's action. What did he do?" The several thousand incidents submitted in response to this inquiry were analysed and categorized to provide a relatively objective and concrete description of the "critical requirements" of combat leadership.

To apply this method to the health professions, several thousand incidents describing observations of especially effective or ineffective colleague behaviour are collected from several hundred health workers representing various age groups, geographical areas, professional categories and specialty interests. For example, in a critical incident study of intern and resident performance (i.e. of the general practitioner) commissioned by the U.S. National Board of Medical Examiners, the American Institute of Research which conducted the study collected over 3000 incidents from physicians across the country. The incidents submitted involved all areas of behaviour: practical, communication and intellectual skills. They identified, for example, such general requisites of competence as "Skill in gathering clinical information," i.e., in taking a competent history and in performing an adequate physical examination, or "Skill in relating to the patient and in gaining his cooperation in a treatment plan". In a similar study conducted by the University of Illinois Center for Educational Development of the critical performance requirements in orthopaedic surgery, over 1700 incidents were collected from more than 1000 orthopaedic surgeons representing various practice settings and sub-specialty interests. An empirical classification defining 94 critical performance requirements, grouped into nine major categories of competence, was derived from the incidents. This operational and prospective definition of the essential components of competence could then be used to determine the goals of specialty training, the design of programmes for their achievement and the criteria and methodology for their evaluation. If educational planning were regularly based on such operationally defined, empirically derived goals, educational programmes would look quite different.

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[1] From "An overview of applied research in medical education problems, principles and priorities". Christine H. McGuire, WHO Report on the Workshop on the Needs for Research in Medical Education, Alexandria, March 1974.

Task analysis

A second method of determining the essential components of professional competence which should define educational objectives consists in detailed task analysis of what various categories of health personnel actually do, and in deriving from that list of tasks a statement of the knowledge and *skills* (what *should be* done, not merely what *is* done) which they must have to perform competently. Such a task analysis should be based on careful, systematic observations of the activities of a representative sample of various categories of staff or on the daily logs of a representative sample who report in minute detail the way in which they spend their working days over a specified period of time, or on some combination of these two approaches.

Wherever this method has been employed, the results have been most enlightening. For example, in a limited pilot study of paediatricians in a typical small U.S. city, researchers found that all the physicians had different but consistent patterns for taking a history and performing a physical examination. Of the 481 patient visits observed, 222 were well children; an average of 10.2 minutes was spent with these children (range: 7.5 minutes to 13.6 minutes) in contrast with an average of 8.1 minutes spent with ill children (range: 7.4 minutes to 10 minutes). Of the 259 ill children, 104 (i.e. 40%) were diagnosed as having an infection of the upper respiratory tract, 15 had chronic illnesses and five had potentially dangerous diseases. For the total group of 481, optic fundi were examined only nine times and rectals were performed in only six cases; two physicians did not percuss the lung fields for any patient. The greatest amount of time was spent in discussion of nutrition and child development. The single most frequent topic on which advice was rendered in well-child care concerned toilet training. The authors of this study concluded, *"Few aspects of well-child care appear to require the skill of a physician . . . the question is also raised as to whether current training programmes are aggravating the physician manpower shortage by over-training in relation to community health needs."*[1]

This is a question that could apply to all members of health teams in every country; only task analysis or comparable empirical studies will give us the answer.

Epidemiological studies

One of the most interesting of the newer approaches to the use of such studies consists in combining three arbitrarily weighted factors – disease incidence, individual disability and social disruption – to define priorities in health care needs and, hence, in educational effort. As initially developed by Dr. John W. Williamson[2] the three factors are computed as follows: disease incidence consists of a simple tabulation of the frequency of the disease (e.g. pneumonia) or other medical condition (e.g. pregnancy) in the target population. Individual disability involves a determination of the extent of patient disability or risk associated with a given medical condition; an Individual Disability Weight (IDW) is calculated for each condition from three elements: the average length of hospital stay, mortality rates and complication rates. Social disruption represents an estimate of the disruption that would be produced by a given disease or condition in the social group of which the patient is a member; it is based on such factors as cost of illness, age of patient and number of dependents, socioeconomic standing and the like. For each discharged patient a Total Priority Weight (TPW) is calculated combining these elements. This Total Priority Weight is then arbitrarily apportioned among patient diagnoses. Finally, a cumulative total for each diagnosis is calculated from the total patient sample. The resultant ranking represents a quantitative estimate of health care needs or priorities for the population at risk.

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[1] Bergman, A., Probstfield, J. and Wedgewood, R. Performance analysis in pediatric practice: preliminary report. *Journal of Medical Education*, Vol. 42: 262 (1967).

[2] Williamson, J. et al. *Journal of American Medical Association*, Vol. 201: 938 (1967) and Vol. 204: 303 (1968).

It is clear that even with unlimited resources not all of these needs could be met in the present state of our knowledge. The next step therefore consists of determining what portion of total health care needs can be met, given our present understanding of disease and our present treatment possibilities. This portion indicates the target area for application of professional skills and helps to define educational priorities. The goals of education for health service staff can therefore be defined as encompassing those areas of health care needs which cause the greatest total ***preventable*** disability — i.e. those which cause the greatest total disruption that could be reduced or minimized by early diagnosis and appropriate intervention.

In his early studies using this method to review hospital practice in two large community hospitals in widely separated metropolitan areas in the United States, Dr. Williamson found that pregnancy, including uncomplicated delivery, ranked first or second in priority in both hospitals, that cerebral vascular accidents ranked among the first five diagnostic categories in both hospitals and that fractures of the lower extremities ranked among the first five in one hospital. These particular conditions are mentioned because in certain educational institutions there is a general tendency to reduce the amount of clinical instruction for the general medical student in some of these areas. For example, instruction in orthopaedic surgery is often elective despite the fact that trauma in general accounts for a very significant proportion of total preventable disability.

While the study reported above was limited to hospital practice, the same method could easily be applied to any level of health practice. Secondly, while the findings from such epidemiological studies and the particular weights to be assigned to such factors as individual disability and social disruption will, of course, vary markedly in different parts of the world, the approach is clearly applicable to any society for which health personnel are being trained.

In all parts of the world, use of such data will modify the goals and priorities of educational institutions and the emphases in curricula by focusing far greater attention on ambulatory medicine and on the more common causes of disability.

Implications of applied research on goals and priorities

It can be seen from the above that the means are now at hand for supplementing expert judgment with data derived from empirical studies to assist us in defining the roles and, hence, the skills required of students on completion of programmes. If such studies were carried out as a matter of course and if the findings were used to develop explicit educational objectives for the health professions, we should see revolutionary changes in the kinds of health professionals produced and in their training programmes. Furthermore, such changes would have a far greater impact on meeting health care needs than would simple expansion of educational facilities of the conventional type.

Here we should mention some simpler but also more rapid and less costly techniques which can be used to complement or replace other methods. These methods are not mutually exclusive:

— Interviews with members of the profession, who are asked to describe what, in the light of their experience, ***should*** be the functions and tasks of any member of the health team.

— Questionnaires, made up of either open-answer questions (what are the functions of ... ?) or closed-answer questions (which of the tasks listed below . . . ?).

— The simplest method consists of asking each of a group of colleagues to put himself in the shoes of a person needing care and to describe the functions and tasks that he would wish a given member of the health services to be able to perform. Comparison of the lists submitted will lead to rapid agreement on a common list of sufficiently high quality to provide a basis for a productive discussion on the relevance of the programme, for example.

> "Transformation of the present professionally oriented technologically dominated health system into a patient oriented system is the needed ingredient for any successful curriculum change. The patient should be the primary concern of both education and service".
>
> George A. Silver

example of services provided by rural health units*

Each health unit is meant to serve a population of 5000 persons, normally in one village and maybe a few smaller settlements around it. The *bealtb team* of each of these rural health units is made up basically of:

One physician (in charge)
One assistant midwife
One assistant sanitarian, and
One laboratory assistant.

The rural health unit provides the basic health services for the population it serves, i.e.:

- Maternal and Child Health work
- Communicable Disease Control work
- Vital and Health Statistics work
- Environmental Sanitation work, and
- Medical Care work.

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* Adapted from "Three approaches to the analysis of health manpower functions". HMD/79.1, pp.69 – 72. This list was obtained using the questionnaire method and refers to a survey carried out in Egypt in 1969.

Maternal and Child Health work

(a) *Prenatal Care activities:*

1 Comprehensive examination of new patients.
2 Follow up examination of patients.
3 Urine analysis (sugar and albumin, microscopic examination).
4 Taking blood samples and determination of haemoglobin percentage.
5 Weighing of pregnant women.
6 Measurement of blood pressure.
7 Prescription of treatment.
8 Referring patients to hospitals.
9 Giving hypodermic, intramuscular and intravenous injections.
10 Supervision of cleanliness of pregnant women.
11 Carrying out health education activities.
12 Home visiting for non-attendants and during the ninth month.

(b) *Natal Care activities:*

13 Preparation of delivery bags.
14 Conducting normal deliveries at home.
15 Conducting abnormal labour, and transfer to hospital where necessary.
16 Giving hypodermic, intramuscular and intravenous injections.

(c) *Postnatal Care activities:*

17 Home visiting for puerperal cases.
18 Detection and treatment of fever cases.
19 Giving hypodermic, intramuscular and intravenous injections.
20 Carrying out health education and family planning activities.

(d) *Child Care activities:*

21 Weighing of children.
22 Supervision of child cleanliness.
23 Vaccination against poliomyelitis, diphtheria and tuberculosis.
24 Temperature taking.
25 Carrying out medical examination.
26 Prescribing treatment.
27 Referring patients to hospitals.
28 Isolation of communicable disease cases.

29 Giving hypodermic, intramuscular and intravenous injections.

30 Taking blood samples.

31 Circumcision of male children.

32 Prescribing the diet.

33 Home visiting for non-attendants.

(e) *Miscellaneous technical activities:*

34 Preparing the clinic.

35 Sterilization of instruments and supplies.

36 Training of midwives and assistant midwives.

37 Preparation of drugs for distribution.

Communicable disease control work:

(a) *Activities related to cases:*

38 Isolation of cases.

39 Disinfection of cases (during and after treatment).

40 Dusting of cases (for disinfestation).

41 Giving instructions at home (education).

42 Supervision of domiciliary treatment of tuberculosis patients.

43 Recording in communicable disease register.

44 Search for the source of infection.

(b) *Activities related to contacts:*

45 Surveillance of contacts

46 Immunization of contacts.

(c) *General preventive activities:*

47 Vaccination against poliomyelitis, diphtheria and tuberculosis.

48 Noting names of non-attendants.

49 Preparation of list of families.

50 Carrying out periodic dusting.

51 Recording in disinfection and dusting registers.

52 Controlling insects and rodents.

53 Carrying out epidemiologic surveys for case finding.

54 Isolation of detected cases.

(d) *Activities related to deaths:*

55 Receiving notifications of deaths and search for relations.

56 Examination of the dead and establishment of death certificates.

57 Recording in the appropriate registers.

58 Issuing of burial permits.

Vital and health statistics work:

59 Recording of births and deaths in the appropriate registers.

60 Making weekly and monthly reports.

61 Calculation of death ratios, etc.

62 Making statistical studies and interpretations.

Environmental sanitation work:

63 Numbering of houses and population census.

64 Mapping areas and facilities.

65 Ensuring cleanliness in and around dwellings.

66 Hygienic disposal of refuse.

67 Constructing latrines in village houses.

68 Control of bilharzial snails.

69 Identification of breeding places of mosquitos.

70 Mapping breeding places of mosquitos.

71 Checking hygiene of public latrines.

72 Carrying out measures ordered by doctor.

73 Supervision of environmental sanitation activities.

74 Examination of food in public places.

75 Taking samples from food.

76 Destroying spoiled food.

77 Surveillance of market and street vendors.

78 Taking water samples from public standpipes.

79 Enforcement of laws concerning cemeteries.

80 Examination and certification of food handlers.

81 Carrying out health education activities.

Medical care work

(a) *Diagnosis activities:*

82 Preparing the patient.

83 Taking the history.

84 Recording clinical observations.

85 Weighing the patient.

86 Taking the temperature.

87 Counting the respiration.

88 Counting the pulse.

89 Measurement of blood pressure.

90 Clinical examination.

91 Requesting laboratory tests.

92 Taking blood samples and administering transfusions.

93 Microscopic examination of blood and blood grouping.

94 Urine examination for parasites, chemical analysis and microscopic examination of urine.

95 Requesting X-ray examination.

96 Examination of stools.

(b) *Therapeutic activities:*

97 Prescribing treatment and/or diet.

98 Giving hypodermic, intramuscular and intravenous injections and drips.

99 Giving oral medication.

100 Applying artificial respiration.

101 Catheterization.

102 Application of hot and/or cold compresses.

103 Administration of enemas and use of stomach pump.

104 Suction of mucus.

105 Making dressings.

106 Eye painting and irrigation.

107 Making surgical stitches and performing minor operations.

108 Removal of surgical stitches.

109 Carrying out health education and supervising patient's diet.

110 Observing patient's condition.

111 Application of external treatment (ointment).

112 Radiotherapy.

113 Physiotherapy.

Administrative work:

114 Assignment of jobs and activities.

115 Checking attendance.

116 Giving leave permits.

117 Conducting legal investigations.

118 Management of equipment and supplies.

119 Management of financial matters.

120 Filling in forms.

121 Book-keeping.

122 Correspondence.

123 Preparation of monthly and annual reports.

124 Recording attendance in waiting-room.

125 Supervising housekeeping of the unit.

126 Supervising transportation.

□ □

Please Note!

You are reminded that this list, drawn up in 1969, describes the services as they were and not as they *should have* been. It might seem that preventive activities deserved greater prominence.

□ □

EXERCISE

1. Take *one* category of health personnel (e.g. physician, or nurse, or midwife, or medical assistant, or sanitarian and *circle* the items on the preceding list corresponding to the *activities which that category of staff is supposed to carry out* in your country at present.

2. Then think of some activities which that same category does not undertake at present but which you feel, in the light of your personal experience, *it should undertake* to improve the level of health of the population it serves. Draw a *square* around each of the corresponding items on the list.

3. Describe below any *unlisted* activities corresponding to the first two questions.

educational objective (derived from professional tasks)

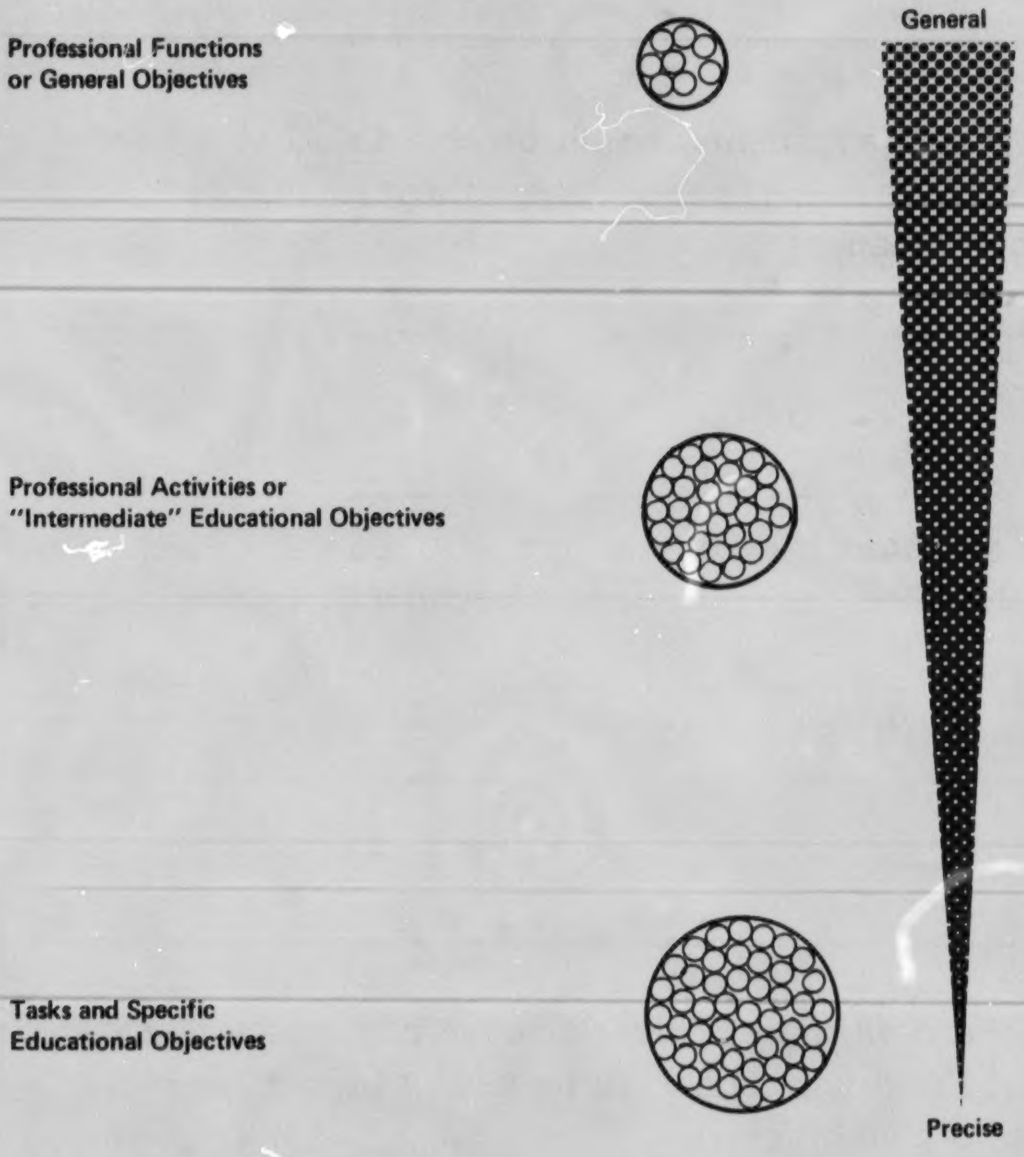
What the students should be able to do at the end of a learning period that they could not do beforehand.

Educational objectives are also called "learning objectives" as opposed to "teaching objectives".

They define what the *student,* not the teacher, should be able to do.

The definition of the objective of a course is that of the result sought, not a description or summary of the programme.

relationship between professional acts in the health field and educational objectives


Professional Functions or General Objectives
Professional Activities or "Intermediate" Educational Objectives
Tasks and Specific Educational Objectives
General
Precise

Note. The size of the circles relates to the number of objectives: the more specific they are the more numerous they are. The triangle indicates that at the general level objectives are "wide", broad, vague, and that specific objectives are "punctual", narrow, precise.

types of educational objectives

1 **General objectives:** Correspond to the functions of the type(s) of health personnel trained in an establishment.

Example: Providing preventive and curative care to the individual and the community, in health and in sickness.

2 **"Intermediate" objectives:** Arrived at by breaking down professional functions into components (activities) which together indicate the nature of those functions.

Example: Planning and carrying out a blood sampling session for a group of adults in the community.

3 **Specific (or instructional) objectives:** Corresponding to (or derived from) precise professional tasks whose results are observable and measurable against given criteria.

Example: Using the syringe, to take a blood sample (5 ml.) from the cubital vein of an adult (criteria: absence of haematoma; amount of blood taken within 10% of the amount required; not more than two attempts).

To gain better understanding of these three levels of educational objectives and the relationship between them, study pp. 1.23 – 1.25 and 1.29 – 1.36.

data necessary for formulation of educational objectives

- **Health needs, demands and resources of society.**
- **Services to the patient (list of tasks).**
- **Service to the community (list of tasks).**
- **The profession itself.**
- **The students.**
- **Progress in sciences.**
- **The scientific method.**

etc. . . . . .

For more details refer to: Criteria for the evaluation of learning objectives in the education of health personnel. Report of a WHO Study Group. *World Health Organization Technical Report Series,* 1977, No. 608. 47 pages*
and pp. 4.10 – 4.13 of this Handbook.

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* An annex to the report clarifies what different authors mean by educational objectives, examines the different levels and types of objectives, lists the potential benefits of taking the trouble to formulate objectives and reviews the data considered necessary for this. There is also a short section on how to word objectives properly.

EXERCISE

Take the time to list the **main functions** of the category of health personnel that interests you (dentist, nurse, sanitary engineer, physician, pharmacist, midwife, etc.). Where possible, refer to documents published on the subject in your country (national health plan, professional publications, etc.). If no such data are available, rely on your own experience.

The professional functions of ....* are as follows.

*insert the name of the profession in which you are interested. E.g., "the nurse", "the general practitioner", "the dentist", etc.

1. ____

____

2. ____

____

3. ____

____

4. ____

____

5. ____

____

6. ____

____

7. ____

____

8. ____

____

EXERCISE

Read the three following pages and revise if necessary your own list of functions.

The professional functions of . . . . are as follows:

□ □

Everyone who uses a word knows what he means by it. The problem is that everyone doesn't realize that other people may have different meanings for the same word.

Mager

□ □

general objectives
professional functions

There will be as many lists of these as there are categories of staff trained in the institution concerned.

The following examples of general educational objectives at the *institutional* level are real sets of objectives as formulated by health personnel training institutions.

They are only examples. Compare them with the functions you listed on p.1.21. You may find that some of the items are almost identical. At this general level the acts required to meet the health *needs* of the population will have some points in common all over the world. This is quite understandable. At this level of general *functions* it is not surprising that nurses, physicians, midwives or dentists, for example, should exercise similar types of functions, such as treatment, prevention, planning, education of the public, training of colleagues, etc. The differences between the professions will emerge from the more detailed list of intermediate objectives, describing the *activities* of each category and from the even more specific list of *tasks*. The different types of objectives form a whole. They are given meaning by their relationships and interdependence.

What should be noted at this stage is that all the examples are relatively *short* (one page) and rather vague. You will also note that they define everything the *students* should be able to do at the end of their training.

They do not define what the *teachers* do but rather what the institution's "end-product" is. They are also known as institutional objectives.

The fact that the examples that follow are numbered does not imply that they are classified in order of importance. Obviously each function can be more or less important as compared with another, depending on the health system in which the qualified student will work and on the overall stage of development of the country.

The prominence of the function "health education of the public" will depend on the population's general level of education. Similarly, functions relating to planning will be very different depending on the development context and degree of organisation of the country. Physicians and nurses in less developed countries may have to assume greater responsibilities in this field than their counterparts working in more developed countries.

Whatever the relative importance of a given function, what counts at this stage is that it exists: you will find it useful to bear this in mind throughout the training process. Now read the examples that follow.

Institutional Objectives(1)

The graduates of the M.D. programme should be able:

1. To identify health problems in their totality and to show skills in collecting, processing and presenting data pertaining to health problems, and subsequently to resolve and manage them, from the individual level through the family level to the community level.
2. To diagnose and manage frequently occurring diseases in the community (including emergencies), to identify and provide primary care in serious diseases, taking account of their physical, emotional and social aspects.
3. To manage health centres at various levels and in a variety of settings and to work effectively and efficiently in health teams, in teaching, research and service, with available facilities.
4. To apply basic principles in health education in order to assist and lead the planning, implementation and evaluation of health programmes in promoting health, preventing disease, cure and rehabilitation, according to the needs of the community and local social, religious, customary and cultural values which can influence the state of health and disease.
5. To identify personal limitations, and to nurture the capacity and interest in enhancing their knowledge and developing personal characteristics required for professional advancement through an awareness of personal assets and limitations.
6. To function as an effective and efficient member of a team with a sense of responsibility and dependability.

(1) Adapted from Gadjah Mada University Faculty of Medicine, Yogyakarta, Indonesia.

Institutional Objectives(1)

At the end of his M.D. programme(1) the graduate will have acquired or developed the knowledge, abilities, and attitudes necessary to qualify for further education in any medical or related health career. The achievement of the general goals should enable a student:

1. To identify and define health problems at both an individual and a community level and to search for information to resolve or manage these problems.
2. To examine the underlying physical, biological and behavioural mechanisms of health problems. This includes a spectrum of phenomena from the molecular to those involving the patient's family and community.
3. To investigate community health problems and to recommend efficient and effective approaches to deal with environmental, occupational, behavioural, and public policy issues.
4. To develop the clinical skills and methods required to define and manage the health problems of patients, including their physical, emotional, and social aspects, within the context of effective health care.
5. To recognize, maintain, and develop the personal characteristics and attitudes required for a career in a health profession. These include:
    a. Awareness of personal assets, limitations, and emotional reactions.
    b. Responsibility and dependability.
    c. Ability to relate to, and show concern for, other individuals.
6. To be a self-directed learner, recognizing personal educational needs, selecting appropriate learning resources, and evaluating personal progress.
7. To assess critically professional activity related to patient care, health care delivery, and health research.
8. To function as a productive member of a small group which is engaged in learning, research, or health care.
9. To work in a variety of health settings.

(1) from McMaster University, Canada.

Institutional Objectives(1)

Description of Practitioner of Tomorrow (Nursing)

The graduate of the new baccalaureate nursing programme will be prepared to function as a generalist with beginning competencies in a specialized area of nursing.

The graduate will be prepared to function in a variety of settings and *be able to:*

1. Obtain health histories and make general health assessments.
2. Provide safe and competent care in emergency situations and acute illnesses.
3. Provide supportive care to persons with chronic or terminal health problems.
4. Provide health teaching, guidance and counselling.
5. Assist persons to maintain optimal health status.
6. Provide for continuity of health services.
7. Assume leadership responsibility for planning and evaluating nursing care.
8. Work effectively with all persons concerned with health care problems.

This baccalaureate nurse, as a practitioner of nursing, will be accountable and responsible to clients for the quality of nursing whether administered directly or indirectly.

(1) From the University of Washington School of Nursing.

These three examples of general educational objectives are from both developed and developing countries.

What is striking is the overall similarity between the *functions* listed, even if they are expressed in different terms:

- providing treatment
- providing preventive care
- planning services
- health education of the population
- collaboration with other services in the interests of overall development
- training of health personnel
- evaluation of own activities
- continuous development of own skills

They were gathered during a recent *world-wide* survey designed to collect general educational objectives for nurses and physicians. Identical results were obtained; that is, the same functions came up in practically every case. This collection of *functions* corresponds to the *role* that health services personnel are expected to fulfil.

Throughout this Handbook you will be invited to use this list of functions (and others if necessary, depending on the health needs of the population in your country) as the *basis* for your future educational decision-making.

To demonstrate how such an obvious list can in fact be a very effective instrument, you are invited to use it at once in making a quick analysis on the next page.

EXERCISE

Tricky test to force you to think about the relevance of a programme

Take the *functions* you listed on p.1.21

For each function that corresponds to one of those listed in the table below, ask yourself the following two questions:

In the institution where I work

1. are teaching activities organized to help students acquire skills corresponding to each function listed?
2. do the examinations (counting towards award of diploma) effectively measure the students' abilities in relation to each function listed?

– Where you can answer YES (without blushing), mark a cross in the + column.
– If no corresponding activity is organized by your institution, mark a cross in the 0 column.
– If you are not sure, mark a cross in the "+ or –" column.

	Teaching activities that help student to perform function			Examinations providing effective measurement of function		
Functions	+	+ or –	0	+	+ or –	0
Curative						
Preventive						
Planning						
Health Education						
Collaboration						
Training of other categories						
Evaluation						
Self-training						

Draw your own conclusions . . . .

General educational objectives provide a useful basis for preparation of a relevant programme

professional activities and intermediate objectives

Intermediate educational objectives are obtained by breaking down each function (or general objective) into smaller components. These components are professional activities which in their turn can be broken down into more specific acts that are called professional tasks *as long as they can be measured against given criteria*. (See p. 1.35 *et seq.* for specific objectives). It can also be said that all objectives that are neither general nor specific are on the intermediate level. That is, there can be several intermediate levels rather than a single one.

The pages that follow give examples of intermediate objectives[1]. Unlike general objectives, whose vagueness makes them fairly universal, intermediate objectives reflect the health needs of a population living in a given *context*. This restrictive list of diseases, therefore, would have been different in the case of a general practitioner in Finland or in Cameroon because of the special geographical epidemiology of each country. The social and political system and the type of health services provided will also have an influence. These are the factors that ensure the relevance of educational objectives. Another important point to be taken into consideration: this list, like any other list of educational objectives, is only a means or working instrument and not an end in itself. It was drawn up as a basis for choosing instruments of evaluation for measuring the skills of students during their internship.

**Examples
of intermediate educational objectives**

These intermediate educational objectives were derived from general objectives defining the functions of a general practitioner. They refer to the paediatric aspect of his work.

The general practitioner should be able to carry out the following activities:

1. Diagnose and treat major childhood disorders:
   - abnormal development of the embryo or foetus
   - infections in newborn babies
   - emergency surgery on newborn babies
   - jaundice of the newborn
   - vomiting in infants
   - cardiac insufficiency
   - acute diarrhoea
   - dehydration
   - convulsions
   - purulent meningitis
   - tuberculous meningitis
   - tuberculosis
   - eruptive fevers
   - viral bronchopneumonia
   - bacterial pneumonia
   - septicaemia
   - childhood skin disorders
   - urinary infections
   - acute glomerular affections
   - abdominal tumours
   - enlargement of liver
   - enlargement of adenoids
   - enlargement of spleen
   - kala-azar
   - malaria
   - throat infections
   - otitis
   - orthopaedic problems in children

2. Carry out activities relating to patient care, taking of samples, laboratory work and use of equipment.

   2.1 Sampling techniques:
   - blood (including blood from umbilical cord)
   - abcess
   - cerebrospinal fluid (CSF)
   - urine
   - puncture of ascites, pleura

   2.2 Techniques relating to patient care, preventive measures and laboratory work:
   - immunization
   - perfusion, intramuscular injection, transfusion
   - catheterization, enema
   - blood grouping
   - haematocrit
   - erythrocyte sedimentation rate

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[1] Prepared by a multidisciplinary group of teachers from Algeria. Workshop on docimology, Timimoun, Algeria, February 1977.

- CSF count

2.3 Use of equipment:

- sphygmomanometer
- otoscope
- aerosol spray
- aspirator
- electrocardiograph
- ophthalmoscope

3. Distinguish between normal newborn babies and those at risk; organize prevention and early detection of possible dangers.
    - 3.1 Plan care of a normal newborn baby.
    - 3.2 Plan treatment of a newborn baby with a diabetic mother.
    - 3.3 Plan treatment of a Rh negative newborn baby.
    - 3.4 Plan treatment of a newborn baby with kidney disease.
    - 3.5 Plan treatment of a newborn baby with low birth weight.
    - 3.6 Plan treatment of a premature baby.
    - 3.7 Plan treatment of a baby born after abnormal labour.

4. Plan, in collaboration with the parents, individual and collective surveillance of growth, nutrition and psychomotor development in children (newborn babies, infants, children).
    - 4.1 Recognize growth anomalies.
    - 4.2 Recognize anomalies of psychomotor development.
    - 4.3 Work out with the parents a diet suitable for the needs of their child.
    - 4.4 Recognize dietary anomalies.
    - 4.5 Plan a surveillance programme for a normal child and for one at risk.
    - 4.6 Enter findings in the child's medical record.

5. Identify somatic problems (particularly relating to growth and nutrition), psychomotor and emotional problems in a sick child on the basis of medical history and clinical examination.
    - 5.1 Question parents of a sick child and make a record of the information obtained.
    - 5.2 Examine a sick child.
    - 5.3 Make a note of the findings.
    - 5.4 On the basis of a clinical examination, determine the problems presented by a sick child (particularly relating to growth, nutrition and psychomotor development).

6. Protect children individually and collectively against the effects of hereditary conditions, communicable diseases and accidents.
    - 6.1 Offer advice on genetic matters to parents.
    - 6.2 Determine the mode of transmission of hereditary diseases.
    - 6.3 Detect and treat hereditary diseases.
    - 6.4 Investigate home conditions of a child with a communicable disease.
    - 6.5 Examine contacts of a child with a communicable disease and apply preventive measures.
    - 6.6 Carry out all immunizations.
    - 6.7 Draw up a schedule for a child never or inadequately immunized.
    - 6.8 List, in order of frequency, the accidents that happen to children in a given sector.
    - 6.9 Organize and participate in a campaign to prevent accidents to children.

7. Identify mental health problems in children; propose measures and participate in their application.
    - 7.1 Determine the priority mental health problems in children of his own health sector.
    - 7.2 Coordinate health, administrative and educational resources available for dealing with mental health problems in children (particularly those relating to maladjusted or abandoned children).

8. Evaluate the effects on child health of the environment; propose appropriate measures and ensure that they are applied, individually and collectively.

8.1 List environmental factors in his own area of work.

8.2 Help improve environmental conditions in collaboration with the health authorities.

8.3 Identify a child seriously threatened by his environment.

8.4 Detect and treat a disorder caused by the environment.

8.5 Advise parents on drawing optimum benefit from a favourable environment.

9. Be accessible to the child and his family, providing health education and the support needed in case of disease or disability.

Organize his plan of work to ensure that:

9.1 He is accessible to the child and his family.

9.2 He has time to listen to them.

9.3 He has time to talk to them.

9.4 He has time to reassure them

9.5 He has time and the ability to provide the child and his family with the necessary health education.

10. Organize prevention, detection and follow-up of deficiency diseases and chronic conditions.

10.1 Apply national regulations for the prevention of deficiency diseases.

10.2 Detect and treat the following deficiency diseases in a given population:

- protein and calorie malnutrition
  marasmus
  kwashiorkor
- hypovitaminoses
  vitamin D deficiencies
  (rickets)
  vitamin A deficiencies
  (hemeralopia, xeroma)
  vitamin B complex deficiencies
  (beriberi, pellagra, megaloblastic anaemia)
  vitamin C deficiencies
  (scurvy)
- iron deficiency
  (anaemia due to lack of iron).

10.3 Detect and treat chronic conditions in children:

- diabetes
- haemoglobinopathy
- thalassaemia
- rheumatic conditions
- metabolic disorders
  (phenylketonuria, glycogenosis, glucose 6-phosphate dehydrogenase deficiency, galactosaemia)
- congenital or acquired heart conditions
- chronic respiratory insufficiency
  (mucoviscidosis, bronchial dilatation, deformations of the thorax, asthma . . .)
- epilepsy
- haemophilia
- chronic allergic conditions
  (eczema, allergies in the upper respiratory tract, asthma . . .)

11. Organize, participate in an evaluate treatment and preventive activities (medical and otherwise).

11.1 Allocate tasks among members of a health team in his area of work.

11.2.1 Carry out a paediatric consultation.

11.2.2 Decide to admit a patient to hospital.

11.3 Work in a ward as part of a team.

11.4 Organize reception and surveillance of emergency cases.

11.5 Take part in the activities of a maternal and child health centre.

11.6 Deal with problems relating to drugs and equipment.

11.7 Help organize an immunization campaign.

11.8 Propose and ensure application of non-medical measures required to back up medical activities in the field of prevention and hygiene.

11.9 Set up a mechanism of periodic evaluation by all team members of his own and the team's activities, in terms of their objectives.

12. Help families to use health and administrative bodies concerned with improving child health.
   - 12.1 Ensure health coverage of all children living in his area.
   - 12.2 Enumerate the health structures that exist in his area.
   - 12.3 Enumerate the administrative, political and economic bodies in his area.
   - 12.4 Assess the role played by each of the preceding in improving child health.
   - 12.5 Organize optimum use of health facilities.
   - 12.6 Promote and enforce measures aimed at improving child health.

13. Plan training and retraining of health staff.
   - 13.1 Remedy any gaps in the skills of members of his health team.
   - 13.2 Organize the training and/or continuous education of members of the health team.
   - 13.3 Evaluate the training and further education activities of health team staff.

□ □

The definition of educational objectives has become almost a fashionable subject of conversation . . . defining them is becoming a mark of modernity . . . but, as with all slogans, there is a danger that we shall get used to them without understanding their purpose, their nature, their advantages, their limitations and the risks involved.

In drawing up educational objectives, what counts is not their formal definition but their relevance to the professional tasks of the personnel to be trained.

□ □

Before going any further, think about the concept of relevance and about the fact that educational objectives are a means and not an end.

It seems reasonable to believe that an educational programme has more chance of being effective if its purposes have been clearly expressed. Experimental research in the field of evaluation indicates that it is not possible to measure the results obtained from an educational system if its objectives have not been explicitly defined. But a desire for precision should not divert us from a much more important concern: the need for *relevance.*

To be relevant an educational programme, rather than being the result of a non-selective mass of knowledge accumulated over the centuries, should be selectively shaped in terms of the aims to be achieved. Each time the goal is modified, the programme too must be modified accordingly.

Thus relevance is the degree of conformity that exists between training programmes on the one hand and the population's health needs and resources on the other.

When determining educational objectives, therefore, we must take into account the health needs and resources of society, the health professions, the progress of science, the capabilities of the students, the social and cultural context, etc. Moreover, the study made of these factors must be ***prospective***[1] in nature since we are training personnel for the future.

The method traditionally used is to bring together eminent professors and the result of their deliberations is presented as a list of chapter headings. Often, existing programmes are used as the main source of data for the preparation of the new programme. The professors indicate the ***number of hours*** to be devoted to the various subjects to be dealt with: this generally leads to a conflict of personalities and it is the most forceful, the most persuasive, sometimes the most irascible or noisiest of the participants in the discussions who obtains the largest number of hours. The result is that the time factor becomes a ***constant*** and that ***competence remains an undefined variable.***[2]

In the absence of a definition of relevant educational objectives, discussions on programmes, teaching methods and evaluation methods are difficult and often futile.

When educational objectives have been established at the intermediate level (lists of activities), it is then possible to determine with some precision which learning activities are likely to facilitate the attainment of an objective and which are not.

Methods of evaluation (of students, teachers and methods) will also depend on the objectives to be achieved. Evaluation consists in being able to say to what *extent* and *how* the objective set has been achieved. If one has not bothered to lay down a *measurable* objective, it will be difficult to make any kind of evaluation. To select a type of examination (to use an old-fashioned term) without educational objectives makes no more sense that to try to choose a measuring instrument without knowing what has to be measured. Only over the last two decades have investigators in the field of testing and measurement begun to work out a solution to this problem. Here, too, the weight of tradition and emotional reactions make themselves felt.

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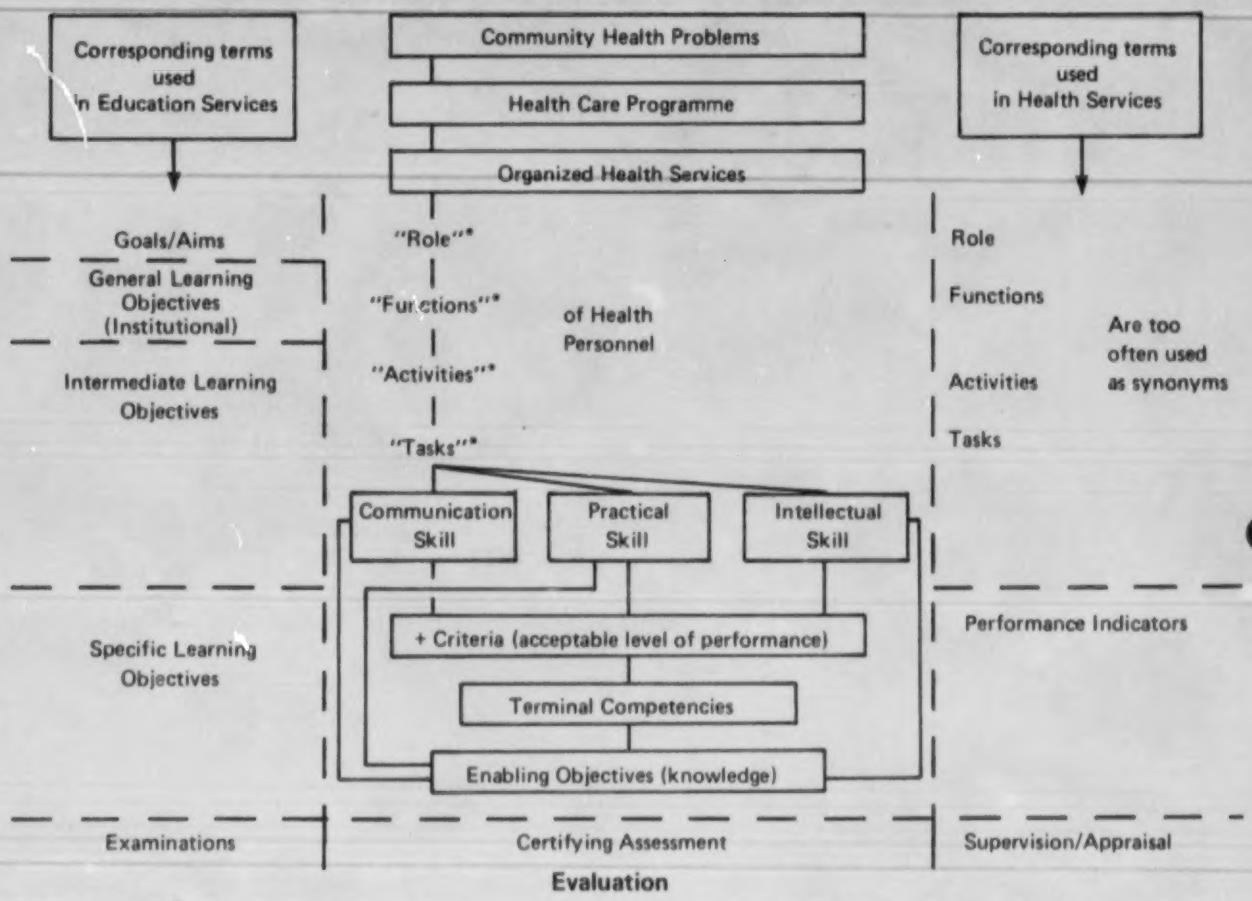
[1] The epidemiological, sociological data, etc., and the operational research necessary for such a prospective analysis are not dealt with in this Handbook. For information on these matters the reader should consult specialized publications dealing with the organization of health services (see Bibliography, p. 7.01 *et seq.*).

[2] For example, the length of medical studies is fixed by administrative regulations at 6 years (or 7, 5 etc.): this is the time constant. On the other hand, there is hardly any definition of the competence of graduates, and this can lead to great variability.

Built-in relevance approach to educational planning


Corresponding terms used in Education Services
Community Health Problems
Health Care Programme
Organized Health Services
Corresponding terms used in Health Services
Goals/Aims
General Learning Objectives (Institutional)
Intermediate Learning Objectives
"Role"*
"Functions"*
"Activities"*
"Tasks"*
of Health Personnel
Role
Functions
Activities
Tasks
Are too often used as synonyms
Communication Skill
Practical Skill
Intellectual Skill
Specific Learning Objectives
+ Criteria (acceptable level of performance)
Terminal Competencies
Enabling Objectives (knowledge)
Performance Indicators
Examinations
Certifying Assessment
Supervision/Appraisal
Evaluation

some definitions *

Role: Pattern of motives and goals, beliefs, values, attitudes and behaviour (played by a person in society) which one has to assume (o); *functions* performed by someone (w); "the role of a teacher".

Function(s): A set of *activities*, expected of a person by virtue of his position. (The function of a chairman is to "preside over meetings") (w).

Activity: A combination of specific tasks whose fulfilment leads directly to the achievement of a function.

Task(s) Any piece of work that has to be done (o); a specific piece of work expected to be finished within a certain time; *a set of actions* necessary to the fulfilment of a given activity.

Competence (y) Ability required to carry out a task; sufficiency of qualification (o); the quality of being functionally adequate or having sufficient skill for a particular function; competence is a potential which is realized at the moment of performance.

Performance The carrying out of a task: the doing of any *action* or work; the execution of an action;

Action: The process of doing, working (o).

Skill Practical knowledge in combination with ability (o).

dexterity in the execution of learned physical or intellectual *tasks* (w).

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*Sources: Oxford English Dictionary (o), Webster (w).

professional tasks and specific educational objectives

Having established the principal functions that outline the role of a health worker, we then went on to achieve a greater degree of precision by describing the activities corresponding to each function. Now we must go further and define each of the specific professional tasks corresponding to each activity. Let us continue with the example furnished by our Algerian colleagues.

They decided to define the tasks corresponding to activity 11.4: "Organize reception and surveillance of emergency cases" (see p. 1.31).

Here is the list:

11.4.1 Check the availability of equipment needed for emergencies (drugs, instruments, beds), using a checklist.
11.4.2 Treat, in order of urgency, several patients who arrive at once.
11.4.3 Support the vital functions of a child, in accordance with an *ad hoc* outline of procedures.
11.4.4 Avoid any action that could endanger the life of the child.
11.4.5 Handle the child gently.
11.4.6 Reassure the child.
11.4.7 Explain to the parents why the child must be kept in hospital.
11.4.8 Offer moral support to the parents.
11.4.9 Organize a surveillance schedule for an emergency case (cf. activity 1).
11.4.10 Decide to move the patient.
11.4.11 Plan the move.
11.4.12 Prepare a newborn baby for transfer.
11.4.13 Prepare a child for transfer.
11.4.14 Explain to the parents how the administrative structures involved in admissions and departures function.
11.4.15 Identify the various administrative structures involved in a referral.
11.4.16 Distribute work among health personnel assigned to the emergency service.
11.4.17 Elicit the reasons for various surveillance activities from nursing staff.
11.4.18 Explain the reasons for various surveillance activities to nursing staff.
11.4.19 Reassure the mother of a child admitted to hospital.

The definition of educational objectives must result from a collective effort, in which the students have a part to play.

Any hopes that teachers may have of developing the ***motivation*** of students will be realized only when the latter have really been able to make a choice, that is, to decide for themselves on the tasks (educational objectives) to be performed. For this the tasks (objectives) must be clearly defined and presented as a choice; *it is even better if the students can participate in their formulation.*

identifying the components of a task

An analysis of the tasks listed above shows that performance of some tasks involves not only ***practical skills*** (e.g., handle the child . . . . , 11.4.5) but also ***communication skills*** (same example; handle the child gently) and, finally, ***intellectual skills*** (e.g., distribute work among health personnel, 11.4.16). All three components are involved in some tasks; in others, only two (e.g., 11.4.5 or 11.4.16) and sometimes only one (11.4.11). In some cases the various components (practical, communication and intellectual skills) overlap to such an extent that it is possible only to identify the one that predominates. For example, "Offer moral support to the parents" (11.4.8) is ***principally*** a matter of attitude (communication skills). Of course, in some cultural contexts this could be expressed by an act, a gesture or a tone of voice. To know what attitude to adopt, previous ***knowledge*** of the milieu and its customs is obviously necessary. Another example is "Decide to move the patient" (11.4.10). This is primarily an "intellectual" problem. The decision (intellectual activity) will be taken on the basis of the information available at a given moment. Of course, that information will have been obtained by means of practical skills (physical examination of patient) and the human aspect of the problem cannot be overlooked. To sum up, it can be said that a professional task will often be represented by practical skills. Since those practical skills usually involve another person (the patient, his family, a colleague), a certain *attitude* (communication skill) will be appropriate. Lastly, some measure of intellectual skill *(knowledge)* will be needed for performance of the *task*.

Identification of all the components of each task is therefore recommended, to ensure that each component is taken into account during the successive stages of the educational process. The learning process and teaching activities will be designed to facilitate assimilation of each component, and the same will apply when the time comes to evaluate the students.

The classification that follows will help you by providing more details about the three domains of practical, communication and intellectual skills.

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If the jargon seems obscure, remember to consult the Glossary (p. 6.01 *et.seq.*).

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classification of educational objectives into three domains: practical, communication and intellectual skills[1]

To help teachers in precise formulation of educational objectives, systems of classification into domains (practical skills; attitudes or communication skills; intellectual skills and knowledge) and within each domain (different levels of the process) have been put forward by various specialists in education and psychology.

One of their reasons was to try to clear up the confusion resulting from the use of ambiguous objectives such as "The student should have a good understanding (or knowledge) of . . . . "

For some, "good understanding of the law of X" may mean that the student should be capable of giving the mathematical formula for the law or saying what it means, and for others that he should also be able to use the formula to solve a problem or show the interdependence of the law in relation to other phenomena. No one questions the need for students to have a "good understanding" of a particular phenomenon, law or principle, fact or theory. However, what satisfies one teacher and enables him to say whether a student has in fact achieved a "good understanding" may be very different from what would satisfy another teacher, unless they have agreed on what they mean by "good understanding" through the use of unambiguous terminology.

Education studies have often been criticized for the imprecision of their terminology and concepts. The chief value of a classification is that it enables educators to communicate more precisely among themselves.

This improved understanding will enable those responsible for programme construction to work together. A classification system could also be of use in evaluating the results of a system of education.

Definition and evaluation of the quality of the instruction in a school, country or region poses a very difficult problem; and a well-designed system of classification can play an important role in finding a solution. Another important function is to help educators to prepare examinations for students who have received instruction. A classification is also useful in general as a research tool in education and evaluation.

We do not feel that strict classification is possible. Overlapping of adjacent categories will occur everywhere, as is the case in all aspects of human thought and activity. What counts is not to label but to understand and to develop a common language.

We do not propose to give a detailed account of the various classification systems put forward by B. S. Bloom, D. Krathwohl, R. Gagne or E. Thorndike. We shall limit ourselves to presenting an appropriate and simplified classification for each of the three domains.

1. *Domain of attitudes (communication skills)*. The dictionary tells us that an attitude is "behaviour representative of feeling or conviction; a persistent disposition to act either positively or negatively towards a person, group, object, situation or value". (Webster).

For the purposes of this Handbook we shall restrict this domain to everything concerning relations between health personnel and the members of the community they will serve. It will therefore be almost entirely a matter of *interpersonal relations*. This is why it is referred to as a communication skill. Three levels can be distinguished.

1.1 The first is the level of *Receptivity* or attention; it implies sensitivity to the existence of a certain phenomenon and includes a willingness to receive.

Example: Noticing the anxiety of a patient awaiting the result of a laboratory test for a disease that can have serious consequences.

1.2 The second level is that of Response. This implies sufficient interest in the phenomenon noticed to do something about it.

Example: In the case described in the previous example, the response would be to say a few reassuring words to the patient so that he does not feel alone.

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[1] Summary of an article by Dr. J.-J. Guilbert, *Didakta Medica*, February 1971.

1.3 The third level is that of ***Internalization***. This implies that your perception of a phenomenon has found a place in your scale of values and has affected you long enough for you to adapt yourself to the value system of the other person. This enables you to adapt your attitude to the other person *as if* you were experiencing the same phenomenon yourself.

Example: **On the death of a child, your attitude to members of his family will show them that you care about their grief and are ready to help them to get over it. This does not mean that you have internalized their grief but that you have internalized the attitude that enables you to offer them effective help.**

2. *Domain of practical skills*

By this we mean the routine actions carried out by health workers (intramuscular injection, lumbar puncture, etc.).

Three levels can be distinguished.

2.1 The first level is that of *Imitation* The student, exposed to an observable action, makes an attempt to copy it step by step, guided by an impulse to imitate: he needs a model.

Example: **A student nurse who has seen intramuscular injections performed before her several times tries to imitate the movements involved . . . using an orange.**

2.2 The second level is that of *Control*. At this stage the student is able to demonstrate a skill according to instructions and not merely on the basis of observation. He also begins to differentiate between one set of skills and another and to be able to choose the one required. He starts to be adept at handling selected instruments.

Example: **The student becomes accustomed to carrying out certain acts while performing routine minor surgery under supervision.**

2.3 The third level is that of *Automatism*. A high degree of proficiency is attained in using the skill, which now requires only a minimum of energy.

Example: **An experienced nurse washes a bed-ridden patient carefully and without causing any discomfort; or a physician deftly intubates a road accident victim in the midst of the surrounding confusion.**

3. *Domain of intellectual skills*

In 1963, C. McGuire[1] proposed a classification system derived from that of Bloom[2] and designed more specifically for use in the preparation of achievement tests for students.

Levels

1. Knowledge
    1.1 Recall
    1.2 Recognition of meaning
2. Generalization
3. Solving of a routine problem
    3.1 Interpretation of data
    3.2 Application
4. Solving of an unfamiliar problem
    4.1 Analysis of data
    4.2 Special application
5. Evaluation
6. Synthesis

Three levels are probably enough for the purposes of defining educational objectives and student evaluation. The three levels are taken from McGuire's system.

1 Recall of facts.
2 Interpretation of data.
3 Problem solving.

3.1 The first level is that of ***Recall*** of facts. This involves remembering the facts, principles, processes, patterns and methods necessary for efficient performance of a professional task.

Example: **The student must be able to converse with his fellows and his teachers using professional language which he should understand *without constant reference to a dictionary or other text;* or communicate orally with members of society; or communicate in writing (scientific articles, reports, findings, etc.).**

3.2 The second level is that of ***Interpretation of data***. This is a process of application or use of ideas, principles or methods to deal with a new phenomenon or situation.

---

[1] Centre for Education Development, University of Illinois Medical School.

[2] Bloom, B.S. (ed.), Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain, David McKay, New York, 1956.

Example: **After analysing observable data, the student interprets their meaning, grasps their relationships and arranges them into a known pattern.**

3.3 The third level is that of ***Problem solving*** (relating to diagnosis, treatment, organization, etc.). This at best should include finding solutions for a problem arising from new situations with no precedent to serve as a guide.

Example: **The student, faced with a pathological condition for which he has not been prepared, is able to get on the right track by applying scientific methods and a sound experimental approach.**

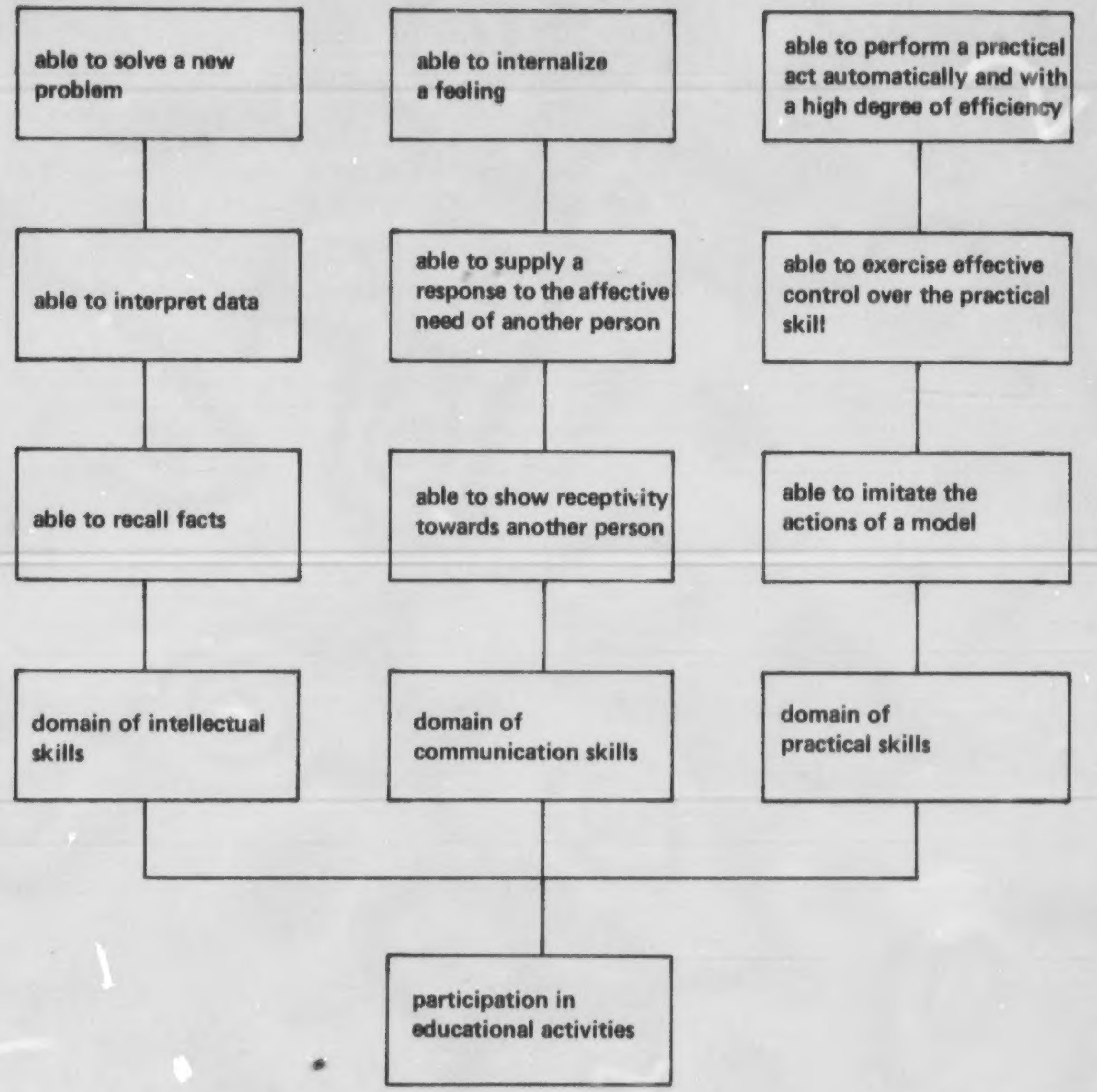
The only purpose of these classification systems is to permit analysis of the learning process and to help teachers in educational decision-making. It is obvious that human behaviour can rarely be divided neatly into practical, communication and intellectual skills. The same division in objectives is somewhat artificial. Neither teachers nor those responsible for preparing programmes can separate them entirely.

These differences will remain artificial as long as we lack the instruments of evaluation needed for simultaneous study of learning experiences in the various domains (practical, communication and intellectual skills). It is to be hoped that explicit definition of educational objectives will gain in importance so that research workers in education can solve certain problems and the choice of appropriate teaching methods will be made easier.

The coding of information for scientific purposes involves reduction of the individual to a few basic characteristics.

Beware! Oversimplification of data can lead to absurd conclusions.

the three classifications (simplified)


able to solve a new problem
able to interpret data
able to recall facts
domain of intellectual skills
able to internalize a feeling
able to supply a response to the affective need of another person
able to show receptivity towards another person
domain of communication skills
able to perform a practical act automatically and with a high degree of efficiency
able to exercise effective control over the practical skill
able to imitate the actions of a model
domain of practical skills
participation in educational activities

Note: Please remember that in human behaviour the three domains are often intricately connected.

EXERCISE

Indicate by a cross the components [practical skill (P), communication skill (C) or intellectual skill (I)] of each of the 19 tasks listed below.

Mark two crosses in the box corresponding to the dominant component.

Domains			*List of Professional Tasks*
P	C	I	
			1. Check the availability of equipment needed for emergencies (drugs, instruments, beds), using a checklist.
			2. Treat, in order of urgency, several patients who arrive at once.
			3. Support the vital functions of a child, in accordance with an *ad hoc* outline of procedures.
			4. Avoid any action that could endanger the life of the child.
			5. Handle the child gently.
			6. Reassure the child.
			7. Explain to the parents why the child must be kept in hospital.
			8. Offer moral support to the parents.
			9. Organize a surveillance schedule for an emergency case.
			10. Decide to move the patient.
			11. Plan the move.
			12. Prepare a newborn baby for transfer.
			13. Prepare a child for transfer.
			14. Explain to the parents how the administrative structures involved in admissions and departures function.
			15. Identify the various administrative structures involved in a referral.
			16. Distribute work among health personnel assigned to the emergency service.
			17. Elicit the reasons for various surveillance activities from nursing staff.
			18. Explain the reasons for various surveillance activities to nursing staff.
			19. Reassure the mother of a child admitted to hospital.

Compare your answers with those of the author of the Handbook, page 1.51.

definition of specific educational objectives

– Refer to the example of a task (p.1.19):

"Using a syringe, take a blood sample (5 ml) from the cubital vein of an adult".

– Break it down into components. The main component is a *practical skill*, but the other two (*communication* and *intellectual skills*) are also involved.

– The criteria proposed in this example (absence of haematoma; amount of blood taken within 10% of the amount required; not more than two attempts) confirm that the person who set the task considered the *practical skill* to be its principal component.

– This type of act occurs frequently in the daily routine of health workers. It resembles the administration of intramuscular injections, lumbar punctures, puncture of ascites, pleura or articulation, gastric intubation.

– The *communication skill* appropriate to all these acts will be the same. It can be defined by acceptable types of behaviour which, when described in an observation table, can be used as criteria (introducing yourself to the patient, making sure that he knows what you are going to do, etc.).

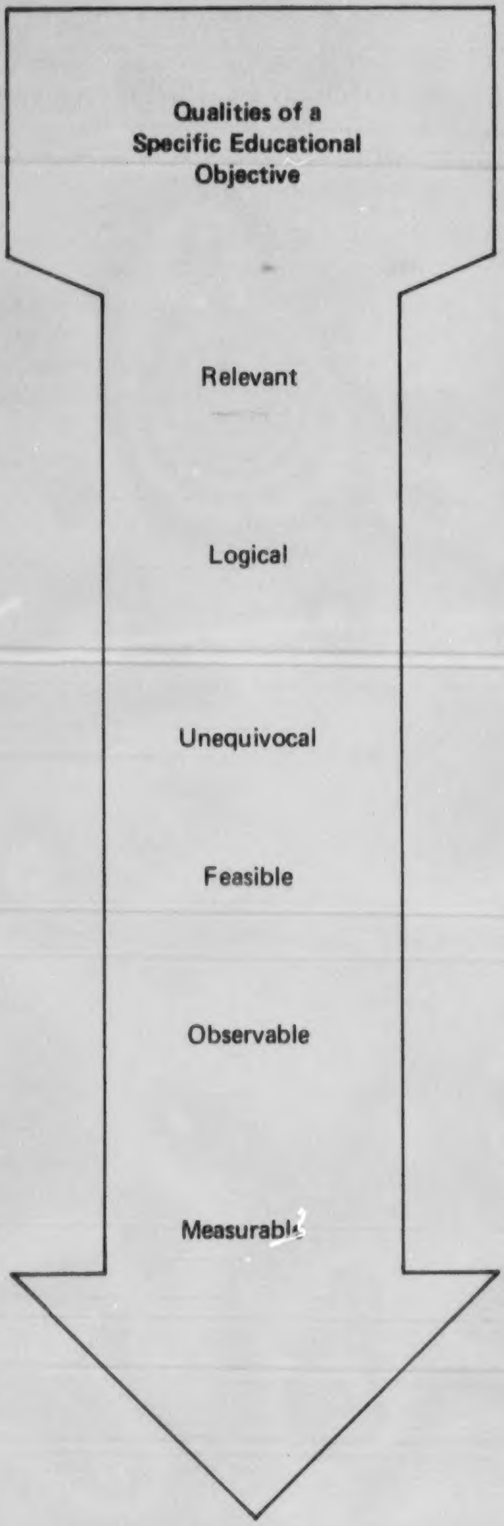
– For all these acts a certain amount of theoretical knowledge or *intellectual skill* is needed (anatomy, sterilization procedures, secondary effects, etc.): this is usually the *prerequisite level* which in its turn can be defined in terms of specific *contributory* educational objectives: (also called enabling objectives):

- sketch from memory the position of the cubital vein;
- list the measures to be taken to ensure sterility during the act.

(in both cases criteria should be established from a textbook).

To sum up, a specific educational objective can be defined as a task accompanied by a criterion indicating an acceptable level of performance for its principal component.

Specific Objective = Task + Criterion



What are the qualities of a specific educational objective?

It must be all of the following:

- *Relevant:* Its definition should be free of any superfluous material but cover every point ***relating to the aims in view***, i.e., the general objectives derived from the health needs of society.
- *Unequivocal:* "Loaded" words (words open to a wide range of interpretations) should not be used, to avoid any possibility of misunderstanding. What do we mean when we say we want a student to "know" something? Do we want him to be able to recite, or to solve, or to construct? To say merely that we want him to "know" tells him too little or too much. The objective is unequivocal when you describe what the learner will have to *do* to demonstrate that he "knows" or "understands", or "can do".
- *Feasible:* It must be ensured that what the student is required to do can *actually* be done, within the time allowed and with the facilities to hand. Remember, too, the basic condition for feasibility: the minimum (practical, communication and intellectual skills) to qualify for the course. This is the ***prerequisite level.***
- *Logical:* the objective must be internally consistent.
- *Observable:* it is obvious that unless there is some means of observing progress towards an objective, it will be impossible to tell whether the objective has been achieved.
- *Measurable:* One often hears "most of what I teach is intangible and *cannot be measured"*. Even rough measurement is better than none at all, for if no measurement is made instructors tend to assume that a goal has been achieved just because they have taught the subject. If your teaching skills cannot be evaluated, you are in the awkward position of being unable to demonstrate that you are teaching anything at all. That is why the objective ***must include an indication of acceptable level of performance*** on the part of the student.

This does not mean that an objective that does not lend itself to measurement by present-day techniques is necessarily a "bad" objective. On the other hand, the existence of a criterion for measurement will make it easier to choose or construct a valid evaluation mechanism, however sketchy this mechanism may be at the start.

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

Prerequisite Level

What the learner has to be able to "do" before undertaking an educational programme.

□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

words often used but open to many interpretations	words open to fewer interpretations
to know	to write
to discuss	to identify
to understand	to differentiate
to really understand	to solve
to appreciate	to construct
to fully appreciate	to list
to believe	to compare
to have faith in	to contrast

etc.

Mager, 1962

1.45

List of active verbs for stating educational objectives

– nonrestrictive list –

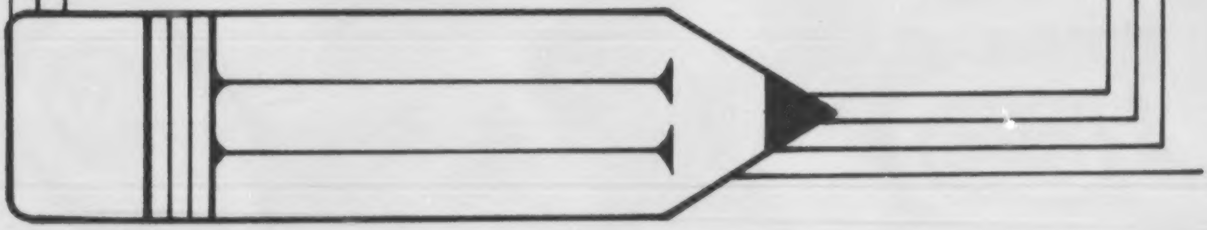
Abbreviate
Act
Administer
Aid
Allow for
Analyse
Apply
Appraise
Arrange
Assist
Ask
Assemble
Attend
Audit
Avoid
Bring
Build
Calculate
Care for
Categorize
Change
Chart
Check
Choose
Circle
Cite
Clean
Close
Collaborate
Collect
Communicate
Compare
Compile
Complete
Compute
Conclude
Conduct
Connect
Construct
Contrast
Contribute
Control
Convert
Cooperate
Correct
Create
Criticize
Decide
Decrease
Deduce
Defend
Define
Delimit
Demonstrate
Derive
Describe
Design
Designate
Detect
Determine
Develop
Diagnose
Diagram
Differentiate
Direct
Discover
Discriminate
Display
Dissect
Distinguish
Divide
Do
Draw
Edit
Effect
Encourage
Enumerate
Enunciate
Establish
Estimate
Evaluate
Examine
Exchange
Execute
Explain
Extract
Extrapolate
Facilitate
Fill
Find
Follow
Formulate
Furnish
Generalize
Generate
Get
Give
Guide
Hold
Identify
Illustrate
Implant
Include
Increase
Indicate
Induce
Infer
Inform
Insert
Integrate
Isolate
Justify
Label
Lead
List
Locate
Maintain
Make
Manipulate
Map
Match
Measure
Meet
Mobilize
Modify
Move
Name
Narrate
Note
Obtain
Omit
Operate
Oppose
Order
Organize
Outline
Paraphrase
Participate
Perform
Pick
Place
Plan
Play
Plot
Point
Position
Practise
Predict
Prepare
Present
Prevent
Prognose
Promote
Protect
Provide
Pursue
Put
Raise
Read
Rearrange
Reassure
Recite
Reconstruct
Record
Recount
Reduce
Regroup
Relate
Remove
Reorder
Reorganize
Rephrase
Replace
Request
Reset
Resolve
Respond
Restate
Safeguard
Select
Send
Separate
Serve
Set
Share
Simplify
Solve
Sort
Speak
Specify
Start
State
Store
Structure
Suggest
Supply
Support
Synthesize
Tabulate
Take responsibility (for)
Teach
Tie
Time
Trace
Translate
Treat
Underline
Use
Utilize
Verify
Wash
Weigh
Work
Write

EXERCISE

If you feel the list on the previous page is incomplete, go ahead . . . . add the active verbs relating to the category of health personnel that interests you.

Relevance is
the essential quality
of educational objectives

Objectives which have every
quality except relevance
are potentially dangerous



elements of a specific educational objective

$$\left.\begin{array}{r}\text{the act}\\[2em]\text{the content}\\[2em]\text{the condition}\end{array}\right\}\quad\text{the task}$$

+ the criteria

> To say what one means by an objective is neither to reduce the importance of the objective nor its profundity . . . the act of writing it down means merely that what was once secret is now open for inspection and improvement.
>
> R.F. Mager

description of the elements of a specific educational objective

- **Act and Content**

– The *act* is the description of the task aimed at, expressed by an active verb.

– The *content* specifies the subject, the theme or substance in relation to which the act is to be performed.

Example: "***Repair*** a binocular microscope" or "***take*** a sample of venous blood". The ***act*** is the verb in italic; the rest of the sentence is the ***content (or subject).***

It is perfectly acceptable for the description of the *act* (of a specific objective) to be stated in terms of a "***performance indicator***" and not in terms of the ***actual act*** required, as long as the latter is quite clear.

The ***performance indicator*** is the description of an act whose satisfactory performance implies that the student is able to accomplish the actual act required.

Example: "***Underline*** in the diagram the names of all the veins that pass *in front* of the corresponding artery".

Here it is obvious that if the act consists of "underlining" it is only a performance indicator from which it can be inferred whether the student is able to "distinguish veins passing *in front* from those in any other position".

In all cases, the appropriate procedure with regard to the *act* (the actual act or a performance indicator) is as follows:

1. Identify the act (for example, by underlining it in the sentence).
2. Decide whether it is an ***actual act*** or a *performance indicator*.
   - 2.1 If it is a performance indicator, decide whether it enables an inference to be made concerning the actual act.
     - (a) If so, decide whether it can be simplified and whether it corresponds to the student's level.
     - (b) If not, write another one.
   - 2.2 If it is an actual act, decide whether it is explicit or implicit.
     - (a) If it is explicit, decide whether it can be simplified and whether it corresponds to the student's level.
     - (b) If it is implicit, include a "performance indicator". .

- **Condition**

– This is the description of the circumstances in which the act must take place (data, restrictions and limitations).

- **Criterion**

– The definition of the *acceptable level of performance* expected from the student.

□ □

Let us take a *specific* educational objective and identify each of its *elements:*

"Identify on frontal X-ray films of the thorax the presence or absence of opacities of the pulmonary parenchyma, of more than 2cm diameter in 80% of cases."

Act: "Identify the presence" indicates the act to be performed.

Content: "Opacities of the pulmonary parenchyma."

Condition: "Frontal X-ray films of the thorax" are provided to the student.

Criterion: The student must identify "in 80% of cases any opacity of over 2cm diameter".

□ □

EXERCISE

You can check your choice by turning to p. 1.60, questions 15 – 20 and the answers on p. 1.62.

Identify the four elements of the following objective:

To be able to: repair a binocular microscope (brand X, Y or Z) having been informed of the defect and given a descriptive diagram, appropriate tools and spare parts, so that the microscope functions according to specifications.

- *Act:*
- *Content:*
- *Condition:*
- *Criterion:*

Answers to exercise on page 1.41

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
P		++	++		+							++	++					+	
C		+	+		++	++	++	++				+	+	+	+	+	++	+	++
I	++	++	+	++			+		++	++	++	+	+	++	++	++	+	++	+

If your choices were different, it does not necessarily mean they are "wrong". Possibly the active verbs used for some of the tasks are open to several interpretations.

EXERCISE

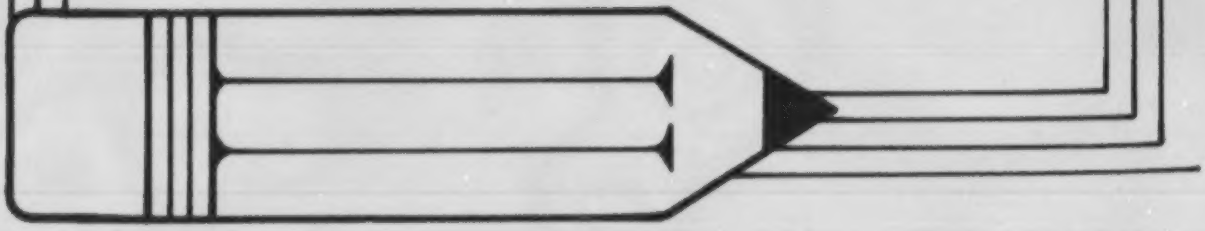
Please Note! Before starting this exercise cover the area inside the dotted line ○○○○○○○

Decide which of the specific educational objectives given below (prepared by participants in workshops) conform to the standards described in the preceding pages. Is each one really a professional task? Does it include an act and content, conditions and a criterion? (Answer Yes or No). What is its principal component?

Specific educational objectives. The student must be able to:	Professional task	Act and content	Condition	Criterion	Principal component		
					C	P	I
1. Make a differential diagnosis of anaemia on the basis of a detailed haematological picture described in the patient's records.	Yes	Yes	Yes	Yes			++
2. Determine the health conditions of a family in its environment by making three home visits.	Yes	Yes	Yes	No	+		++
3. During a prenatal consultation, recognize at least three major symptoms of pre-eclampsia.	Yes	Yes	Yes	Yes		+	++
4. Give oral care with the available equipment (according to technical sheet X) to a patient confined to bed and conscious.	Yes	Yes	Yes	Yes	+	++	
5. Read one issue of a professional journal every fortnight, outside working hours. Criterion: write a summary (not more than 10 lines) of at least one of the articles.	Yes	Yes	Yes	Yes			++
6. During a prenatal consultation, carry out examinations for detecting and preventing complications of pregnancy (according to technical sheet Y).	Yes	Yes	Yes	Yes	+	++	+
7. Make a survey (prepare questionnaires, carry out the survey, interpret the results) of the habits and customs of a population for the identification of those which represent a danger to health.	Yes	Yes	No	No	+		++
8. Give from memory two *similar* and two *dissimilar* characteristics concerning the immunological value of and the epidemiological indications for (a) inactivated, and (b) attenuated polio vaccines.	No	Yes	Yes	Yes			++
9. Measure the length of a newborn baby, using an infant measuring board, with a maximum error of 1 cm.	Yes	Yes	Yes	Yes	+	++	
10. Identify by microscopic examination three of the following micro-organisms: meningococcus; Hansen's bacillus; human tubercle bacillus; gonococcus.	Yes	Yes	Yes	Yes		+	++
11. Using an optical microscope (magnification x 40), diagnose granulation tissue on a slide in five minutes, indicating at least five points of recognition present on the slide.	Yes	Yes	Yes	Yes		+	++
12. Make a macroscopic diagnosis of a benign breast tumour in an operation specimen and indicate at least four characteristics of benignity observed.	Yes	Yes	Yes	Yes			++

Don´t forget!

The essential quality of educational objectives is their *relevance* to the health needs of society



EXERCISE

1. Draw up **specific** educational objectives[1] corresponding to **three** professional tasks that are familiar to you, stating explicitly what you feel the student should be able to "do" in relation to the general and intermediate objectives.

2. Identify the principal component of each objective (domain of practical, communication or intellectual skills).

3. Define the *criterion* indicating the *acceptable level* of performance for each objective.

The student must be able to perform the following tasks:

1st task

2nd task

3rd task

---

[1] If necessary, refer back to the section dealing with their essential qualities, pp. 1.35 – 1.50.

4. For one of the tasks, describe the theoretical knowledge you think the student should have if he is to be capable of working towards the corresponding objective.

Set out the content of this *prerequisite level* in the form of *specific educational objectives.* Check that they include all the necessary elements (act and content, conditions, criteria).

To show that he has the knowledge needed for task no. . . . . , the student must be *able to:*

5. For one of the tasks describe features of behaviour showing that the student has the communication skills you would regard as adequate were he responsible for a member of your own family. Describe this behaviour in terms of specific objectives.

For task no. . . . , the student should have the attitude shown by the fact that he is *able to:*

EXERCISE

Check your Results

Indicate whether each of the specific objectives you have defined above satisfies the following conditions:

(1) Is it really a professional task (or derived from one)? (2) Has the principal domain been identified? (3) Does it include the **four elements: act, content, condition and criterion?** (The criterion must relate to the principal component: communication skill (C), practical skill (P) or intellectual skill (I)).

Objective	Professional Task		Domain(s)[1]			Act		Content		Condition		Criterion	
	Yes	No	C	P	I	Yes	No	Yes	No	Yes	No	Yes	No
1													
2													
3													
4													
5													

---

[1] Indicate the principal component by ++, others by +.

EXERCISE

Instructions: for each question select one answer.
(Check your answers on p. 1.62)

Question 1.

Which of the following statements **is in contradiction** to the theories expounded in this chapter:

A. The change in behaviour resulting from a learning activity is called performance.

B. Final behaviour is the designation of the observable act which will be accepted as proof that the student has achieved a given educational objective.

C. The definition of the objective of a course is a description or summary of the programme.

D. The teaching intent explained by the educational objective indicates what should be the final behaviour of the student.

E. None of the above statements.

Question 2.

An educational objective corresponds to all the following elements **except one.** Indicate which:

A. It is sometimes also called a learning objective.

B. It defines explicitly what the teacher should do.

C. It should be the basis for the preparation of the students' timetable.

D. It can be general or specific.

E. It is defined in behavioural terms corresponding to the tasks to be accomplished.

Question 3.

Mager stresses the need to define educational objectives in operational terms (description of the type of behaviour aimed at). Among the following qualities select the one **which does not correspond** to one of the advantages sought by this technique.

A. It enables the student to evaluate his progress throughout his period of learning.

B. It enables the instructor to choose relevant examination questions.

C. It enables the instructor to make a satisfactory choice of teaching methods.

D. It enables the student to acquire a thorough knowledge of the content, organization and timetable of a course.

E. It enables the student to show clearly, at the end of the course, whether or not he has acquired specific types of behaviour.

Question 4.

A specific educational objective has all the following qualities **except one**. Indicate which:

A. It clearly communicates an educational intent.

B. It makes objective evaluation possible.

C. It defines a measurable behaviour.

D. It establishes success criteria.

E. It facilitates analysis of functions and tasks.

Question 5.

Indicate which of the following statements **does not correspond** to the principles of rational and effective educational planning:

A. Institutional objectives should be defined before selecting a student evaluation system.

B. Institutional objectives should be derived from the objectives of the various departments of a school.

C. Regional health needs should be considered before drawing up an educational system for training members of the health team.

D. Educational objectives should be defined before selecting educational methods and learning activities.

E. National resources and budgetary constraints should be taken into account before defining general objectives

Questions 6 to 11.

There have been numerous classifications of the intellectual process. One of them considers three domains:

1. domain of communication skills.
2. domain of practical skills.
3. domain of intellectual skills.

Using the following code:

A = 1
B = 2
C = 3
D = 1 and 3
E = 2 and 3

indicate the domain(s) to which the following objectives correspond:

Question 6.

The student should be able to name four new ideas concerning tuberculosis control.

Question 7.

The student should be able to measure the length of a newborn infant with a maximum error of 1 cm.

Question 8.

The student should be able, when contraceptives are requested by an 18-year-old girl, to give information on four available methods without expressing any moral judgement.

Question 9.

The student should be able to avoid giving guilt feelings to a five-year-old enuretic child.

Question 10.

The student should be able to construct, using simple data already tabulated, a histogram including title, coordinates and additional details without any mistake in the curve.

Question 11.

The student should be able to make a health education poster for an anti-smoking campaign, given a model and the necessary materials (paper felt, charcoal, coloured pencils, glue, scissors).

Question 12.

Indicate which of the following definitions corresponds to the prerequisite level:

A. What the student should be able to do at the end of the curriculum.

B. What the teacher should summarize before every course so as to place all the students on the same level.

C. The level reached by the student while pursuing an educational objective.

D. What the student should be able to do before undertaking an educational programme.

E. None of the above.

Question 13.

Which of the following statements best corresponds to the educational aim to be achieved:

A. The student is perfectly familiar with the anatomical structure of the thorax.

B. The student appreciates the approach centred on the basic needs of the patient.

C. The student describes in writing the various steps of a nursing care plan in relation to the needs of a patient.

D. The student has a thorough knowledge of the differences between a normal and a premature infant.

E. The student has a thorough understanding of professional ethics.

Question 14.

Indicate which of the following statements best corresponds to the four qualities of an educational objective:

A. The teacher will give five one-hour lectures to a group of 20 undergraduate students. The lectures will deal with the physiopathological mechanisms of the inflammatory process.

B. During a simulation exercise, the student will give a brief written definition of the problem (at least 25 words) and list at least three alternative solutions, indicating which he would adopt and giving the reasons for his choice.

C. The student will show his knowledge of the mechanism of the action of aspirin on the subcortical cells.

D. Using an optical microscope (magnification x 40), the student will diagnose granulation tissue in five minutes, indicating at least four diagnostic elements present on the slide.

E. The student will demonstrate to his teacher, at the patient's bedside, that he has a good grasp of clinical method and sound critical judgement, without any prejudice to his relationship to the patient.

Questions 15 – 20.

Instructions. The following statement comprises certain elements numbered 1 to 4. Using the code given below, select the element(s) that correspond to each of questions 15 – 20.

(1) Repair (2) a binocular microscope (brand X, Y or Z) (3) having been informed of the defect and given a descriptive diagram (of brand X, Y or Z), appropriate tools and spare parts, (4) so that the microscope functions according to specifications.

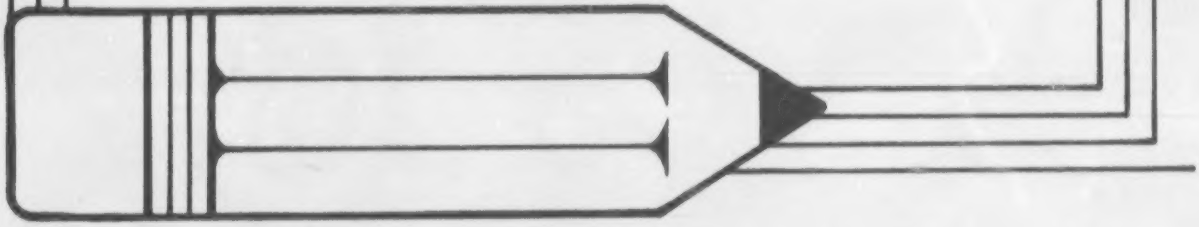
A 1
B 2
C 3
D 4
E 1, 2
F 1, 2, 3
G 1, 2, 3, 4

Questions 15: Which is the task?
16: Which is the act?
17: Which is the specific educational objective?
18: Which is the content?
19: Which is the condition?
20: Which is the criterion?

If you help each learner to develop his/her learning objectives you may not have to do much else.

adapted from Mager

What if it were true?......



Suggested answers for the exercise on pages 1.57 – 1.60

Questions	Suggested Answers	* If you did not give the right answer, reread the following pages:
1	C	1.03 – 1.36
2	B	
3	D	
4	E	
5	B	
6	C	1.36 – 1.41
7	B	
8	D	
9	A	
10	E	
11	B	
12	D	1.44
13	C	1.43 – 1.50
14	D	1.49 – 1.52
15	F	
16	A	
17	G	
18	B	
19	C	
20	D	

notice to the reader

With some effort you have probably been able to reach most of the objectives indicated on page 1.02; this is the first and most important step but there is still a long way to go. Even to define all the specific objectives of your present teaching will be a long job. And after that you must make sure that they correspond to the general objectives, whether explicit or not . . . and it would be reassuring to know that they are really geared to the health problems of tomorrow's population. **Never forget relevance!** And that is not all! Recent studies seem to show that teachers do not know how to *use* the educational objectives they have defined. There is no point in defining thousands of specific objectives if they are not then used as a reference for preparing the educational activities which will lead to their achievement.

There are other awkward questions. Do the objectives you have defined really reflect what is important or merely what is relatively easy to set out in the form of objectives? Will they really help the students, and will the latter be better trained than if . . . etc.

You will be faced with these arguments sooner or later, probably by those who make no attempt to define their own objectives or to learn how to use them. Whatever the limits and drawbacks of this approach is has the undeniable advantage of enabling studies to be made and research to be carried on. To find replies to the questions raised above and many others there is an urgent need for research whose scientific rigour will increase the credibility of the arguments, theories and hypotheses put forward by education specialists. For, however logical arguments may be, they must be backed up by some proof. Thus any attempt at dogmatism in this field or insistence on defining objectives at all costs should be avoided. These indispensable studies will call for considerable experimentation.

You can help in carrying out such experiments.

*

If all this has not discouraged you, go on to the next chapter. Good luck!

> **It would be dangerous to measure with ever-increasing precision and objectivity educational objectives that are easy to measure (intellectual skills) and to neglect the more difficult ones (communication skills) : what must be measured are those that are important for the patient and the community.**

evaluation planning

2

evaluation planning

This second chapter presents basic concepts in the field of educational *evaluation*. It stresses the very close relationship between evaluation and definition of educational objectives; and the primary role of any evaluation, which is to facilitate decision-making by those responsible for an educational system. It defines the subject, the purpose, the goals and the stages of evaluation and highlights the concepts of validity and relevance.

Those who would like to learn more about these problems should consult the following publications:

- Public Health Papers No. 52, WHO, "Development of educational programmes for the health professions", 1974.
- Evaluation of school performance, Educational documentation and information.
  Bulletin of the International Bureau of Education No. 184, third quarter 1972, 84 pages.

After having studied this chapter and the reference documents mentioned you should be able to:

1. Draw a diagram showing the relationship between evaluation and the other parts of the educational process.

2. Define the principal role of evaluation, its purpose and its aims.

3. Describe the difference between formative and certifying evaluation.

4. List the good and bad features of a test.

5. Compare the advantages and disadvantages of tests in current use.

6. Define the following terms: validity, reliability, objectivity, and describe the relationship that exists between them.

7. Choose an appropriate evaluation method (questionnaire, written examination, "objective" test (MCQ or short answer questions) or essay question, oral examination, direct observation, etc.) for measuring the students' attainment of a specific educational objective. Compare the alternatives in a specification table.

8. Define (in the form of an organizational diagram) the organization of an evaluation system suitable for your establishment, and list the stages involved.

Indicate:

(a) the most important educational decisions you have to take;

(b) the data to be collected to provide a basis for those decisions;

(c) the aims of the system and sub-systems in terms of decisions to be taken and the object of each decision (teachers, students, programmes).

9. Identify obstacles to and strategies for improvement of a system of evaluating students, teachers and programmes.

> To change curricula or instructional methods without changing examinations would achieve nothing!
>
> Changing the examination system without changing the curriculum had a much more profound impact upon the nature of learning than changing the curriculum without altering the examination system
>
> G.E. Miller*

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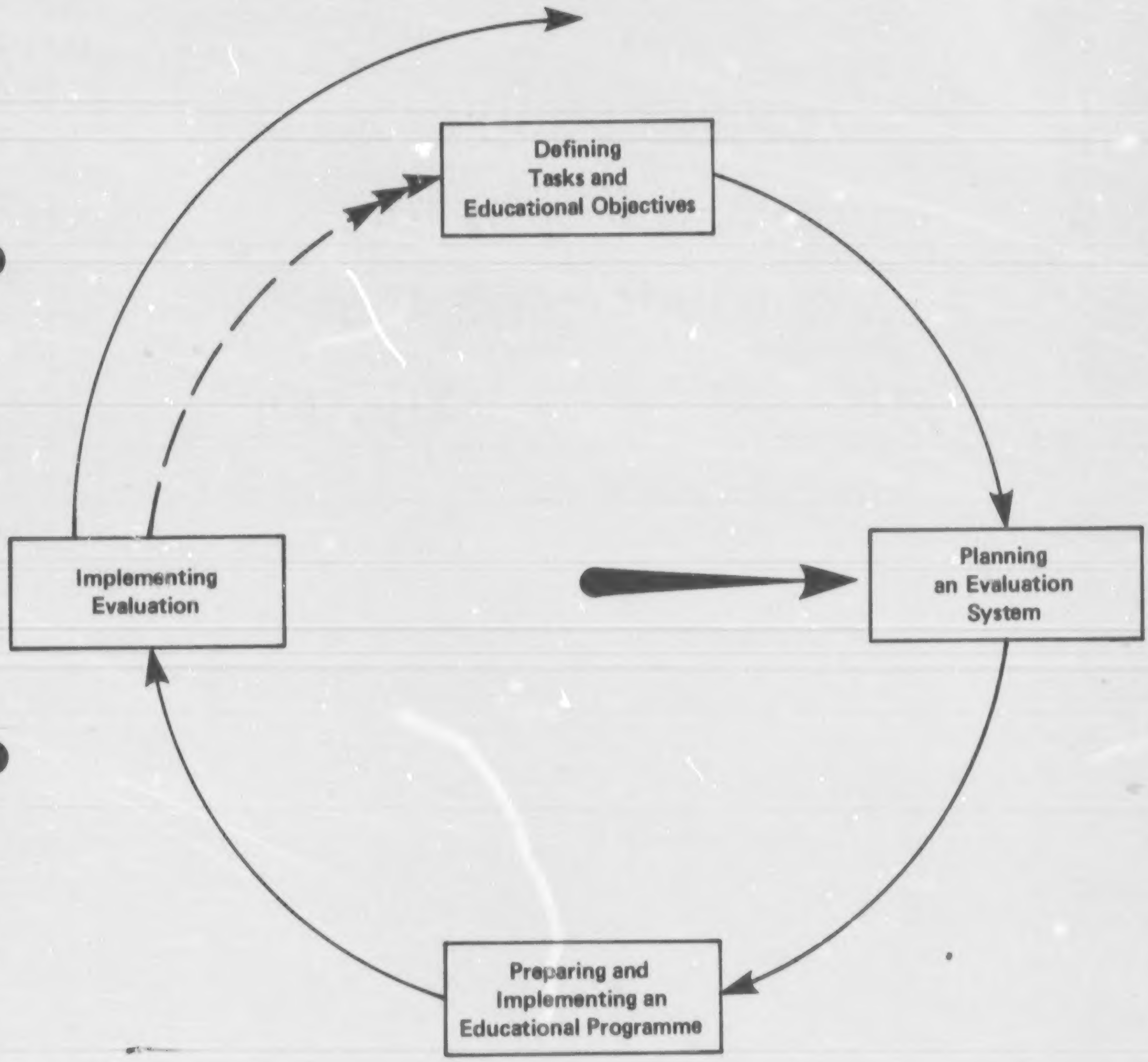
* International Medical Symposium No. 2. Rome. 23–26 March 1977

An analysis of educational innovations all over the world confirms G. Miller's opinion. In this second chapter, therefore, you are invited to ***plan*** a system of evaluation that can be used as a basis for preparation and implementation of a programme. The process is already under way, for the formulation of specific educational objectives requires definition of criteria indicating the minimum level of performance expected from the stuuent. Educational decisions have to be made frequently during preparation and implementation of a programme; and the main purpose of evaluation is in fact to provide a basis for value judgments that permit better educational decision-making. First of all you must decide what you want to evaluate: students, teachers and/or programmes. In each case you must determine what important educational decisions you will be expected to make in your capacity as teacher or administrator, for the instruments and mechanisms of evalution providing data for value judgments will be developed and used according to the type of decision required. A general methodology of evaluation and corresponding techniques do exist. Some are simple; others very complex and costly in time and money. Here again you will make your choice according to criteria that will ensure an adequate level of security. As in every educational process, you will have to shape all the consequences of your decisions into a coherent and logical whole. You are therefore invited to read the next pages before doing the exercise on p. 2.09.

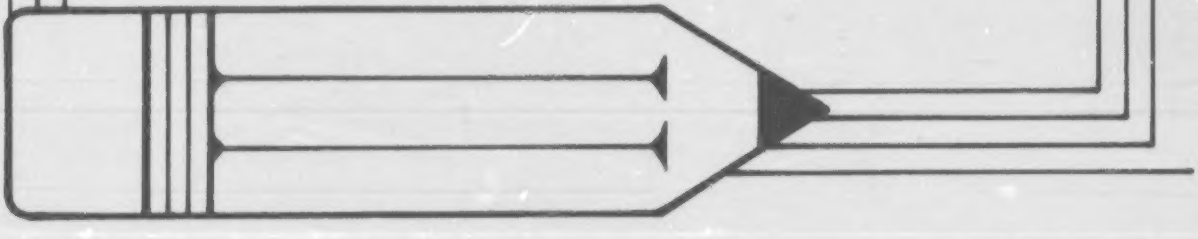
The person who sets the examination controls the programme.

Education by objectives is not possible unless examinations are constructed to measure attainment of those objectives.

the educational spiral

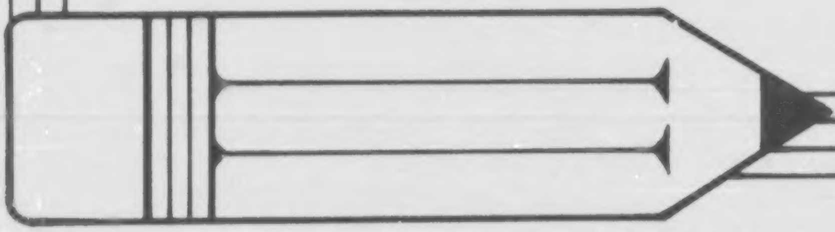

Defining Tasks and Educational Objectives
Planning an Evaluation System
Preparing and Implementing an Educational Programme
Implementing Evaluation

The evaluation process provides a basis for value judgments that permit better educational decision-making



Notice to all teachers

You are reminded that evaluation of education must begin with a clear and meaningful definition of its objectives



Evaluation. . . . . .of whom?

. . . . . .of what?

- ○ **Students**
- ○ **Teachers**
- ○ **Programmes and courses**

. . . . in relation to what?

- ○ **In relation to educational objectives.**
  (They are the common denominator.)

EXERCISE □ □ □ □ □ □ □ □ □ □ □ □ □ □ □

Answer question 2 on p. 2.45.
Check your answer on p. 2.48.

□ □

EXERCISE

Before starting to define the organization, stages or methods of an *evaluation* system suitable for the establishment in which you are teaching, it would be useful to state:

What important educational *decisions** you think you and your colleagues will be taking over the next three years.

*** Examples of educational decisions:**

- **to decide which students will be allowed to move up from the first to the second year**
- **or to decide to purchase an overhead projector rather than a blackboard**
- **or to decide to appoint Mr. X full professor.**

or to decide ....

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You and your colleagues will have to make value judgments as a basis for each decision. It will therefore be useful to plan the construction and use of "instruments of evaluation" that will enable you to collect the data needed for making those value judgments

evaluation — a few assumptions*

- Education is a process, the chief goal of which is to bring about changes in human behaviour
- The sorts of behavioural changes that the school attempts to bring about constitute its objectives
- **Evaluation consists of finding out the extent to which each and every one of these objectives has been attained, and the quality of teaching techniques and teachers.**

* adapted from Downie.

assumptions underlying basic educational measurement and evaluation*

Human behaviour is so complex that it cannot be described or summarized in a single score.

The manner in which an individual organizes his behaviour patterns is an important aspect to be appraised. Information gathered as a result of measurement or evaluation activities must be interpreted as a part of the whole. Interpretation of small bits of behaviour as they stand alone is of little real meaning.

The techniques of measurement and evaluation are not limited to the usual paper-and-pencil tests. Any bit of valid evidence that helps a professor or counsellor in better understanding a student and that leads to helping the student to understand himself better is to be considered worthwhile. Attempts should be made to obtain all such evidence by any means that seem to work.

The nature of the measurement and appraisal techniques used influences the type of learning that goes on in a classroom. If students are constantly evaluated on knowledge of subject-matter content, they will tend to study this alone. Professors will also concentrate their teaching efforts upon this. A wide range of evaluation activities covering various objectives of a course will lead to varied learning and teaching experiences within a course.

The development of any evaluation programme is the responsibility of the professors, the school administrators, and the students. Maximum value can be derived from the participation of all concerned.

the philosophy of evaluation*

1. Each individual should receive that education that most fully allows him to develop his potential.

2. Each individual should be so placed that he contributes to society and receives personal satisfaction in so doing.

3. Fullest development of the individual requires recognition of his essential individuality along with some rational appraisal by himself and others.

4. The judgments required in assessing an individual's potential are complex in their composition, difficult to make, and filled with error.

5. Such error can be reduced but never eliminated. Hence any evaluation can never be considered final.

6. Composite assessment by a group of individuals is much less likely to be in error than assessment made by a single person.

7. The efforts of a conscientious group of individuals to develop more reliable and valid appraisal methods lead to the clarification of the criteria for judgment and reduce the error and resulting wrongs.

8. Every form of appraisal will have critics, which is a spur to change and improvement.

---

* Downie, N.M. *Fundamentals of Measurement: Techniques and Practices*. New York: Oxford University Press, 1967.

evaluation is

a continuous process

based upon criteria

cooperatively developed

concerned with measurement of the performance of learners, the effectiveness of teachers and the quality of the programme*

---

* This chapter is mainly concerned with the evaluation of students. Evaluation of programmes and teachers is dealt with in chapter 4.

the psychology of evaluation*

1. For evaluation activities to be most effective, they should consist of the best possible techniques, used in accordance with what we know to be the best and most effective psychological principles.

2. For many years readiness has been recognized as a very important prerequisite for learning. A student is ready when he understands and accepts the values and objectives involved.

3. It has long been known that people tend to carry on those activities which have success associated with their results. This has been known as Thorndike's *Law of Effect*. Students in any classroom soon come to realize that certain types of behaviour are associated with success – in this case, high marks on a test or grades in a course. Thus, if a certain teacher uses tests that demand rote memory, the students will become memorizers. If a test, on the other hand, requires students to apply principles, interpret data, or solve problems, the students will study with the idea of becoming best fitted to do well on these types of test items. ***In the long run, the type of evaluation device used determines, to a great extent, the type of learning activity in which students will engage in the classroom.***

4. Early experiments in human learning showed that individuals learn better when they are "constantly" appraised in a meaningful manner as to how well they are doing.

5. The ***motivation*** of students is one of the most important – and sometimes the most difficult to handle – of all problems related to evaluation. It is redundant for us to say that a person's performance on a test is directly related to his motivation. Research has shown that when a student is really motivated, performance is much closer to his top performance than when motivation is lacking.

6. ***Learning is most efficient when there is activity on the part of the learner.***

EXERCISE ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Try to answer question 3 on p. 2.45.

Check your answer on p. 2.48.

☐ ☐

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*Downie, N.M. *Fundamentals of Measurement: Techniques and Practices.* New York: Oxford University Press, 1967.

continuous evaluation
formative and certifying evaluation

Evaluation of education must begin with a clear and meaningful definition of its objectives. We cannot measure something unless we have first defined what it is we wish to measure.

When this phase of evaluation (the definition of objectives) has been properly completed, the choice or development of suitable examination procedures is that much easier. Schematically represented, the education cycle (p. 2.05) comprises the determination of objectives, the planning of an evaluation system, the development of teaching activities and the implementation of evaluation procedures with possible revision of objectives.

The role of evaluation should not be limited to one of penalization. It should not be just a series of only too frequent obstacles which the students are supposed to get over and which become their sole subject of concern, the actual instruction becoming quite secondary. Under these circumstances the student's only interest is how to obtain his diploma with least effort. It is the teacher's responsibility to convince the student that his education is directed towards wider aims than merely gaining a diploma and that helping him to do so is not the sole purpose of evaluation (see p. 2.18).

Evaluation should also be *formative*, providing the student with information on his progress. It must therefore be continuous This concept has often been misinterpreted, resulting in constant harassment of the student. There is a fundamental difference between *formative* and *certifying* evaluation.

You will find the following equivalents in the literature for these two expressions:

Formative evaluation or diagnostic evaluation	Certifying evaluation or summative evaluation

□ □

Continuous evaluation must pit the student against himself and his own lack of knowledge and not against other students.

□ □

formative evaluation*

- is designed to inform the student about the amount he still has to learn before achieving his educational objectives;
- measures the *progress* or *gains* made by the student from the moment he begins a programme until the time he completes it;
- enables learning activities to be adjusted in accordance with progress made or lack of it;
- *should in no way be used by the teacher to make a certifying judgment;* the anonymity of the student should be safeguarded by use of a code of his choice. The coding system makes it possible to follow the progress of individuals and groups while preserving anonymity.
- is controlled in its use by the student (results should not appear in any official record);
- is very useful in guiding the student and prompting him to ask for help;
- is carried out frequently – as often as the student feels necessary;
- provides the teacher with qualitative and quantitative data for modification of his teaching (particularly contributory educational objectives) or otherwise.

certifying evaluation

- is designed to protect society by preventing incompetent personnel from practising.
- is traditionally used for placing students in order of merit and justifying decisions as to whether they should move up to the next class or be awarded a diploma.
- is carried out less frequently than formative evaluation: usually at the end of a unit or period of instruction.

EXERCISE

Try to answer questions 4 – 8 on p. 2.45.

Check your answers p. 2.48.

> We don't care how hard the student tried, we don't care how close he got . . . until he can perform he must not be certified as being able to perform.
>
> R.F. Mager

---

* Read the article by C. McGuire – Diagnostic examinations in medical education. In: Public Health Papers No. 52, WHO, Geneva, 1973.

Personal Notes

Strict Rule

Formative evaluation should in no way be used by the teacher against the student.

student evaluation : what for

9 Incentive to Learn (motivation)
10 Feedback to student
11 Modification of Learning Activities
12 Selection of students
13 Success or failure
14 Feedback to teacher
15 School public relations
16 Protection of society
(certification of competence)

appropriate
measuring
techniques

The numbers on the left refer to the exercise on the next page and the questions on pp. 2.45 – 2.47

aims of student evaluation*

1. To determine success or failure on the part of the student. This is the conventional role of examinations (certifying evaluation).

2. To provide "feedback" for the student: to keep him constantly informed about the instruction he is receiving; to tell him what level he has reached; and to make him aware through the questions of what parts of the course he has not understood (formative and certifying evaluation).

3. To provide "feedback" for the teacher: to inform him whether a group of students has not understood what he has been trying to explain. This enables him to modify his teaching where necessary to ensure that what he wishes to communicate to the students is correctly understood (formative and certifying evaluation).

4. The "reputation of the school" is something of which the importance is not always evident, at least in European schools, whose reputation is often based not on an examination system but on long-standing traditions. North American schools, on the other hand, customarily publish the percentage of students who have passed, for example, national examinations (formative and certifying evaluation).

EXERCISE

Now try it . . . indicate for each of the aims of evaluation (numbered 9–16 on the previous page) whether the measurement technique will be of the Certifying Evaluation type (C) or both Certifying *and* Formative Evaluation (CF). Check your answers on p. 2.48.

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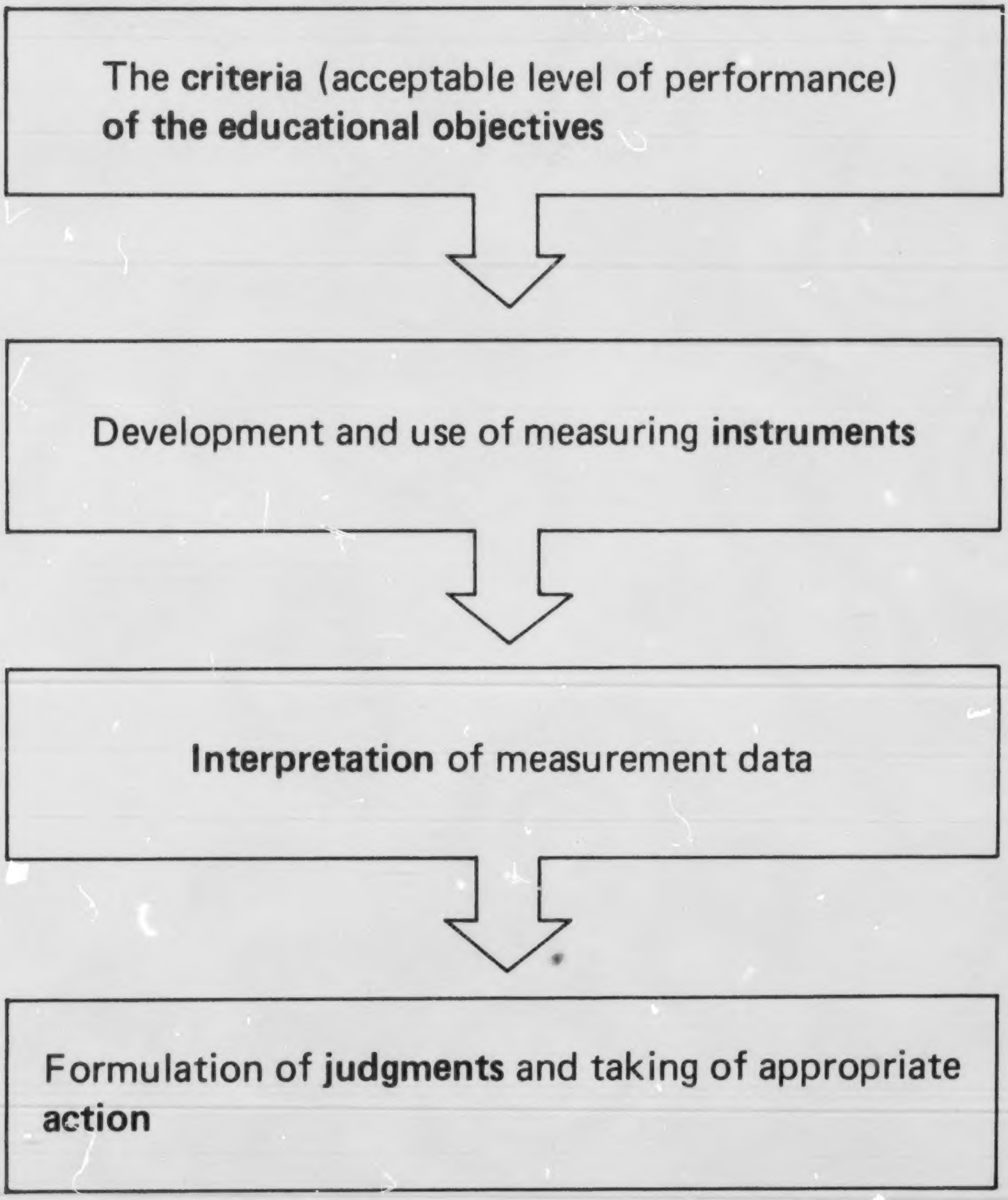
* Adapted from Downie, N.M. *Fundamentals of Measurement: Techniques and Practices.* New York: Oxford University Press, 1967.

four steps in student evaluation

taking as one basis



The **criteria** (acceptable level of performance) **of the educational objectives**

Development and use of measuring **instruments**

Interpretation of measurement data

Formulation of **judgments** and taking of appropriate **action**

2.20

common methodology for student evaluation

- Evaluation of practical skills
- Evaluation of communication skills
- Evaluation of knowledge and intellectual skills

1. Make a list of observable types of behaviour showing that the objective pursued ***has been reached.***
2. Make a list of observable types of behaviour showing that the objective pursued has ***not*** been reached.
3. Determine the ***essential*** features of behaviour in both lists.
4. Assign a positive or negative ***weight*** to the items on both lists.
5. Decide on the ***acceptable performance*** score.

* For the last three stages obtain the agreement of several experts.

Example. ***Objective:*** Reassure the mother of a child admitted to hospital

Attitude	−2	−1	0	+1	+2
Explain clearly what has been done to the child	often uses medical terms and never explains what they mean	often uses medical terms and rarely explains what they mean	rarely uses medical terms and sometimes explains what they mean	rarely uses medical terms and always explains what they mean	uses only terms suited to the mother's vocabulary

etc. See the complete table on p. 4.24.

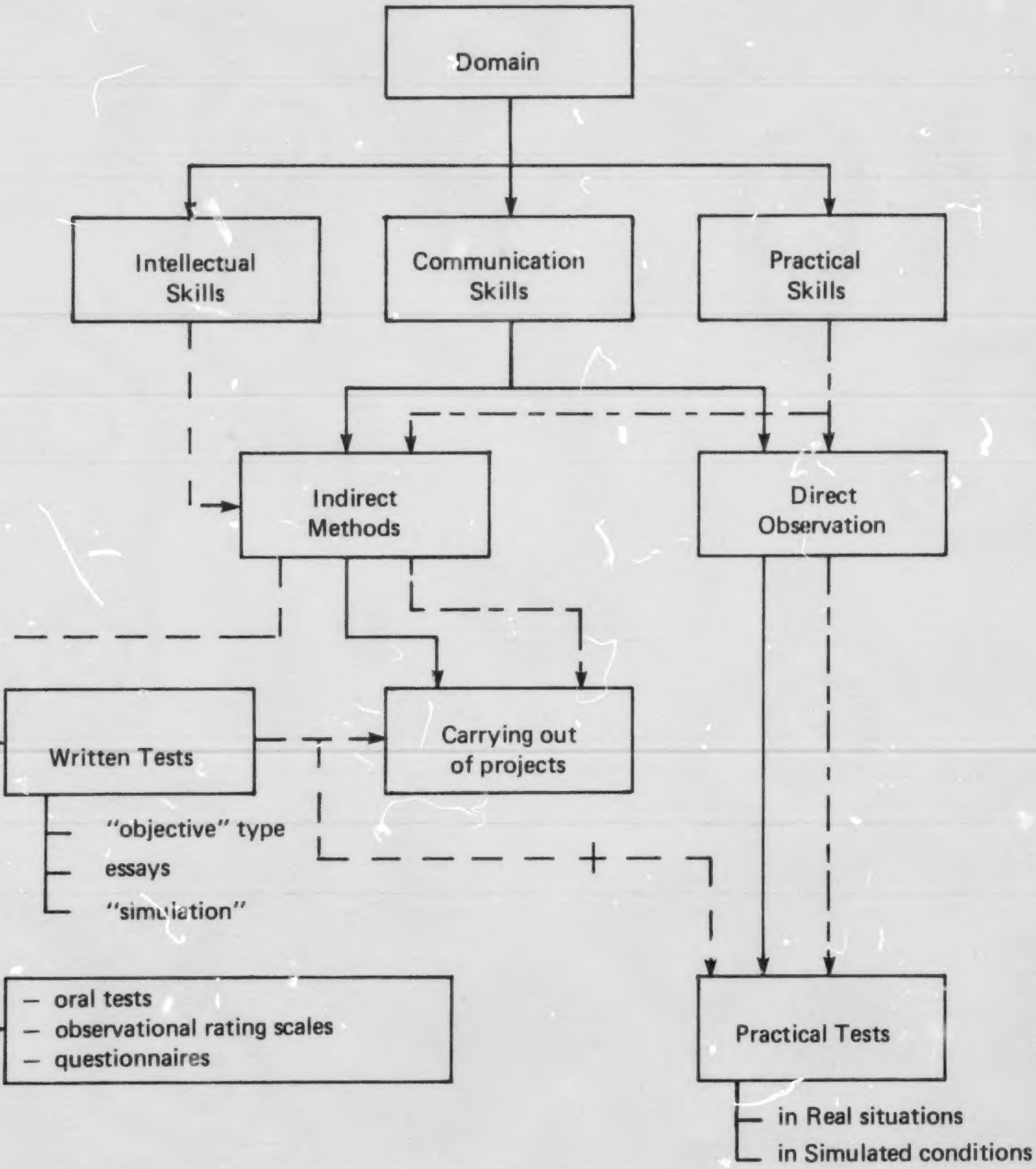
Minimum Performance Score: The student should score n marks out of 10 on the rating scale.

EXERCISE

Try to answer questions 17 – 20 on p. 2.46 and check your answers on p. 2.48.

See also Rezler, Public Health Papers No. 52, pp. 70 – 83.

evaluation methodology according to domains to be evaluated


Domain
Intellectual Skills
Communication Skills
Practical Skills
Indirect Methods
Direct Observation
Written Tests
"objective" type
essays
"simulation"
Carrying out of projects
– oral tests
– observational rating scales
– questionnaires
Practical Tests
in Real situations
in Simulated conditions

EXERCISE

For each of the educational objectives you have already defined (pp. 1.54, 1.55), choose from among the methods of evaluation set out on p.2.22 the one you think most suitable for informing you and the student* on the extent to which the objective has been achieved.

	Objective	Method of evaluation	Instrument of evaluation
EXAMPLES	1 page 1.50	Indirect method	Short, open answer question based on observation of a patient
	2 page 1.50	Indirect method	Questionnaire
	3 page 1.50	Direct observation	Practical examination
1			
2			
3			
4			
5			

---

* For the purposes of this exercise the total number of students to be considered should be fixed: e.g., 100.

general remarks concerning examinations

Analysis of the most commonly used tests shows that sometimes, often even, the questions set are ambiguous, unclear, disputable, esoteric or trivial. It is essential for anyone constructing an examination, whether of the traditional written type, an objective test or a practical test, ***to submit it to bis colleagues for criticism*** to make sure that its content is relevant (related to an educational objective) and of general interest, and does not exclusively concern a special interest or taste of the author; that the subject is interesting and real for the general practitioner or the physicians with a specialty different from that of the author; and that the questions (and the answers in the case of multiple-choice questions) are so formulated that experts can agree on the correct response. It is clear that a critical analysis along these lines would avoid the over-simplification of many tests which only too often justifies the conclusion: "the more you know about a question the lower will be your score".

The author of a test ***is not*** the best judge of its clarity, precision, relevance and interest. ***Critical review of the test by colleagues is consequently essential for its sound construction.***

Moreover, an examination must take the factor of ***practicability*** into account. This will be governed by the ***time necessary*** for its construction and administration, scoring and interpretation of the results, and by its general ease of use.

If the examination methods employed become a burden on the teacher because of their impractical nature he will tend not to assign to the measuring instrument the importance it deserves.

□ □

A discussion is not always pertinent to the problem at hand, but one learns to allow for some rambling. It seems to help people realize that they normally use quite a few fuzzies during what they consider "technical discussions"; it helps them realize that they don't really know what they are talking about . . . a little rambling helps clear the air. Asking someone to define his goal in terms of performance is a little like asking someone to take his clothes off in public – if he hasn't done it before, he may need time to get used to the idea.

R.F. Mager

□ □

qualities of a test

- Directly related to educational objectives
- Realistic & practical
- Concerned with important & useful matters
- Comprehensive but brief
- Precise & clear

considerations of the type of competence a test purports to measure

No test format (objective, essay or oral) has a monopoly on the measurement of the highest and more complex intellectual processes. Studies of various types of tests support the view that the essay and the oral examination, as commonly employed, test predominantly simple recall and, like the objective tests in current use, rarely require the student to engage in reasoning and problem-solving. In short, the ***form of a question does not determine the nature of the intellectual process required to answer it***.

Second, there is often a tendency to confuse the difficulty of a question with the complexity of the intellectual process measured by it. However, it should be noted that a question requiring simple recall may be very "difficult" because of the esoteric nature of the information demanded; alternatively, a question requiring interpretation of data or application of principles could be quite "easy" because the principles of interpretation are so familiar and the data to be analysed so simple. In short, ***question difficulty and complexity of instructions are not necessarily related to the nature of the intellectual process being tested***.

Third, there is often a strong inclination to assume that any question which includes data about a specific case necessarily involves problem-solving, whereas, in fact, "data" are often merely "window dressing" when the question is really addressed to a general condition and can be answered equally well without reference to the data. Or, the data furnished about a "specific case" may constitute a "cut-and-dried", classical textbook picture that, for example, simply requires the student to recall symptoms associated with a specific diagnosis. It is interesting to note that questions of this type can readily be converted into problems that do require interpretation of data and evaluation, simply by making the case material conform more closely to the kind of ***reality*** that an ***actual*** case, rather than a textbook, presents.

In short, just as each patient in the ward or out-patient department represents a unique configuration of findings that must be analysed, ***a test which purports to measure the student's clinical judgment and his ability to solve clinical problems must simulate reality*** as closely as possible by presenting him with specific constellations of data that are in some respects unique and, in that sense, are new to him. Do not try to use a MCQ or a SOAQ to find out whether the student is able to communicate orally with a patient!

However reliable or objective a test may be, it is of no value if it does not measure ability to perform the tasks expected of a health worker in his/her professional capacity.

common defects of examinations (domain of intellectual skills)

A review of examinations currently in use strongly suggests that the most common defects of testing are:

triviality	the triviality of the questions asked, which is all the more serious in that examination questions can only represent a small sample of all those that could be asked. Consequently it is essential for each question to be important and useful;
outright error	outright error in phrasing the question (or, in the case of multiple-choice questions, in phrasing the distractors and the correct response);
ambiguity	ambiguity in the use of language which may lead the student to spend more time in trying to understand the question than in answering it; in addition to the risk of his giving an irrelevant answer;
conservatism	forcing the student to answer in terms of the bias or even the outmoded ideas of the examiner, a bias which is well known and often aggravated by the teaching methods themselves (particularly traditional lectures);
complexity	complexity or ambiguity of the subject matter taught, so that the search for the correct answer is more difficult than was anticipated;
unintended cues	unintended cues in the formulation of the questions that make the correct answer obvious; this fault, which is often found in multiple-choice questions, is just as frequent in oral examinations.

outside factors to be avoided

In constructing an examination, outside factors must *not* be allowed to interfere with the factor to be measured.

complicated instructions **(ability to understand instructions)**	In some tests, the instructions for students on how to solve the problems are so complicated that what is really evaluated is the students' aptitude to understand the question rather than their actual knowledge and ability to use it. This criticism is often made of multiple-choice examinations in which the instructions appear too complicated. The complexity is often more apparent than real and disturbs the teacher rather than the student.
over-elaborate style **(ability to use words)**	The student may disguise his lack of knowledge in such elegant prose that he succeeds in influencing the corrector, who judges the words and style rather than the student's knowledge.
trap questions **(ability to avoid traps)**	This type of interference does not depend on a measuring instrument, but on possible sadistic tendencies on the part of the examiner who, during an examination, may allow himself to be influenced by the candidate's appearance, sex, etc. Some candidates are more or less skilled at playing on these tendencies.
"test-wise"	This is a criticism that is generally made of multiple-choice examinations; it may in fact be applied to other forms of evaluation. In oral and written examinations, students develop a sixth sense, often based on statistical analysis of past questions, which enables them somehow to predict the questions that will be set.

comparison of advantages and disadvantages of different types of test

Oral examinations

Advantages

1. Provide direct personal contact with candidates.
2. Provide opportunity to take mitigating circumstances into account.
3. Provide flexibility in moving from candidate's strong points to weak areas.
4. Require the candidate to formulate his own replies without cues.
5. Provide opportunity to question the candidate about how he arrived at an answer.
6. Provide opportunity for simultaneous assessment by two examiners.

Unfortunately all these advantages are rarely used in practice.

Disadvantages

1. Lack standardization.
2. Lack objectivity and reproducibility of results.
3. Permit favouritism and possible abuse of the personal contact.
4. Suffer from undue influence of irrelevant factors.
5. Suffer from shortage of trained examiners to administer the examination.
6. Are excessively costly in terms of professional time in relation to the limited value of the information it yields.

Practical examinations

Advantages

1. Provide opportunity to test in a realistic setting skills involving all the senses while the examiner observes and checks performance.
2. Provide opportunity to confront the candidate with problems he has not met before both in the laboratory and at the bedside, to test his investigative ability as opposed to his ability to apply ready-made "recipes".
3. Provide opportunity to observe and test attitudes and responsiveness to a complex situation (videotape recording).
4. Provide opportunity to test the ability to communicate under pressure, to discriminate between important and trivial issues, to arrange the data in a final form.

Disadvantages

1. Lack standardized conditions in laboratory experiments using animals, in surveys in the community or in bedside examinations with patients of varying degrees of cooperativeness*
2. Lack objectivity and suffer from intrusion or irrelevant factors.
3. Are of limited feasibility for large groups.
4. Entail difficulties in arranging for examiners to observe candidates demonstrating the skills to be tested.

*Standardized practical tests can be constructed; see "Simulation and evaluation in medicine" in Public Health Papers No. 61, pp.18–34.

Essay examinations

Advantages

1. Provide candidate with opportunity to demonstrate his knowledge and his ability to organize ideas and express them effectively.

Disadvantages

1. Limit severely the area of the student's total work that can be sampled.
2. Lack objectivity.
3. Provide little useful feedback.
4. Take a long time to score.

Multiple-choice questions

Advantages

1. Ensure objectivity, reliability and validity; preparation of questions with colleagues provides constructive criticism.
2. Increase significantly the range and variety of facts that can be sampled in a given time.
3. Provide precise and unambiguous measurement of the higher intellectual processes.
4. Provide detailed feedback for both student and teachers.
5. Are easy and rapid to score.

Disdavantages

1. Take a long time to construct in order to avoid arbitrary and ambiguous questions.
2. Also require careful preparation to avoid preponderance of questions testing only recall.
3. Provide cues that do not exist in practice.
4. Are "costly" where number of students is small.

> **It is a highly questionable practice to label someone as having achieved a goal when you don't even know what you would take as evidence of achievement.**
>
> **R.F. Mager**

evaluation in education
qualities of a measuring instrument

1. *Some definitions*

1.1 It should be recalled once more that ***education*** is defined as a process developed for bringing about changes in the student's behaviour. At the end of a given learning period there should be a greater probability that types of behaviour regarded as ***desirable*** will appear; other types of behaviour regarded as undesirable should disappear.

1.2 The ***educational objectives*** define the desired types of behaviour taken as a whole; the teacher should provide a suitable environment for the student's acquisition of them.

1.3 ***Evaluation*** in education is a ***systematic process*** which enables the teacher to "measure" to what extent the student has attained the ***educational objective***. Evaluation always includes ***measurements*** (quantitative or qualitative) plus a value judgment.

1.4 To make measurements, ***measuring instruments*** must be available which satisfy ***certain requirements*** so that the results mean something to the teacher himself, the school, the student and society which, in the last analysis, has set up the educational structure.

1.5 In education, measuring instruments are generally referred to as "tests".

1.6 Among the qualities of a test, whatever its nature, four are essential, namely, ***validity, reliability, objectivity*** and ***practicability***. Others are also important, but they contribute in some degree to the qualities of validity and reliability.

2. *Qualities of a measuring instrument*

The four main qualities of any measuring instrument (examination) are: validity, reliability, objectivity and practicability.

2.1 ***Validity:*** the extent which the test used really measures what it is intended to measure. No outside factors should be allowed to interfere with the manner in which the evaluation is carried out. For instance, in measuring the ability to synthesize, other factors such as style should not compete with the element to be measured so that what is finally measured is style rather than the ability to synthesize.

Validity is a concept which relates to the results obtained with a test and not to the test itself. It relates more specifically to the interpretation of the results obtained by means of the test.

The notion of validity is a very relative one. It implies a concept of degree, i.e., one may speak of very ***valid, moderately valid*** or ***not very valid*** results.

The concept of validity is ***always specific for a particular subject.*** For example, results of a test on public health administration may be of very high validity for identification of the needs of the country and of little validity for a cost/benefit or cost/efficiency analysis.

Content validity is determined by the following question: will this test measure, or has it measured, the matter and the behaviour that it is intended to measure?

Predictive validity is determined by questions such as the following when the results of a test are to be used for predicting the performance of a student in another domain or in another situation:

To what extent do the results obtained in physiology help to predict performance in pathology?

To what extent do the results obtained during the pre-clinical years help in predicting the success of students during the clinical years?

2.2 ***Reliability:*** this is the consistency with which an instrument measures a given variable.

Reliability is always connected with a particular type of consistency: the consistency of the results in time; consistency of results according to the questions; consistency of the results according to the examiners.

Reliability is a necessary but not a sufficient condition for validity. In other words, valid results are necessarily reliable, but reliable results are not necessarily valid. Consequently, results which are not very reliable affect the degree of validity. Unlike validity, reliability is a ***strictly statistical concept*** and is expressed by means of a reliability coefficient or through the ***standard error*** of the measurements made.

Reliability can therefore be defined as the degree of confidence which can be placed in the results of an examination. It is the ***consistency*** with which a test gives the results expected.

2.3 *Objectivity:* this is the extent to which independent and competent examiners agree on what constitutes a "good" answer for each of the items of a measuring instrument.

2.4 *Practicability* depends upon the time required to construct an examination, to administer and score it and to interpret the results, and on its overall simplicity of use. It should never take precedence over the *validity* of the test.

3. *Other qualities of a measuring instrument*

3.1 *Relevance:* this is the degree to which the criteria established for selecting questions (items) so that they conform to the aims of the measuring instrument are respected. This notion is almost identical to the one of content validity; and the two qualities are established in a similar manner.

3.2 *Equilibrium:* achievement of the correct proportion among questions allocated to each of the objectives.

3.3 *Equity:* extent to which the questions set in the examination correspond to the teaching content.

3.4 *Specificity:* quality of a measuring instrument whereby an intelligent student who has not followed the teaching on the basis of which the instrument has been constructed will obtain a result equivalent to that expected by pure chance.

3.5 *Discrimination:* quality of ***each element*** of a measuring instrument which makes it possible to distinguish between good and poor students in relation to a given variable.

3.6 *Efficiency:* quality of a measuring instrument which ensures the greatest possible number of independent answers per unit of time.

3.7 *Time:* it is well known that a measuring instrument will be less reliable if it leads to the introduction of non-relevant factors (guessing, taking risks or chances etc.) because the time allowed is too short.

3.8 *Length:* the reliability of a measuring instrument can be increased almost indefinitely (Spearman-Brown formula) by the addition of new questions ***equivalent*** to those constituting the original instrument.

validity	The extent to which the instrument measures what it is intended to measure.
reliability	The consistency with which an instrument measures a given variable.
objectivity	The extent to which independent and competent examiners agree on what constitutes a good answer for each of the elements of a measuring instrument.
practicability	The overall simplicity of use of a test, both for test constructor and for students.

relationships between the characteristics of an examination

The diagram on the next page, suggested by G. Cormier, represents an attempt to sum up the concepts of testing worked out by a number of authors. However, no diagram can give a *perfect* representation of reality and the purpose of the following lines is to explain rather than justify the diagram.

A very good treatment of all these concepts will be found in the book by Robert Ebel entitled *Measuring Educational Achievement* (Prentice Hall, 1965).

Validity and reliability

Ebel shows that "to be valid a measuring instrument (test) *must* be both relevant and reliable." This assertion justifies the initial dichotomy of the diagram. It is, moreover, generally agreed that "a test can often, if not always, be made more valid if its reliability is increased."

Validity and relevance

According to Ebel's comments, it seems that the concept of relevance corresponds more or less to that of validity of content. In any case, both are established in a similar manner (by consensus).

By definition, a question is relevant if it adds to the validity of the instrument, and an instrument is relevant if it respects the specifications (objectives and taxonomic levels) established during its preparation.

Relevance and equilibrium

It seems, moreover, that the concept of equilibrium is only a sub-category of the concept of relevance and that is why the diagram shows it as such.

Relevance and equity

It seems evident that if the instrument is constructed on the basis of a content itself determined by objectives, then it will be relevant by definition. If this is not done, then the instrument will not be relevant and consequently not valid. It is equitable in the first case and non-equitable in the second. However, an examination can be equitable without being relevant (or valid) when, although it corresponds well to the teaching content, the latter is not adequately derived from the objectives.

Equity, specificity and reliability

The diagram reflects the following implicit relationship: a test cannot be equitable if it is not first specific. Specificity, just like equity and for similar reasons, will affect the reliability of the results.

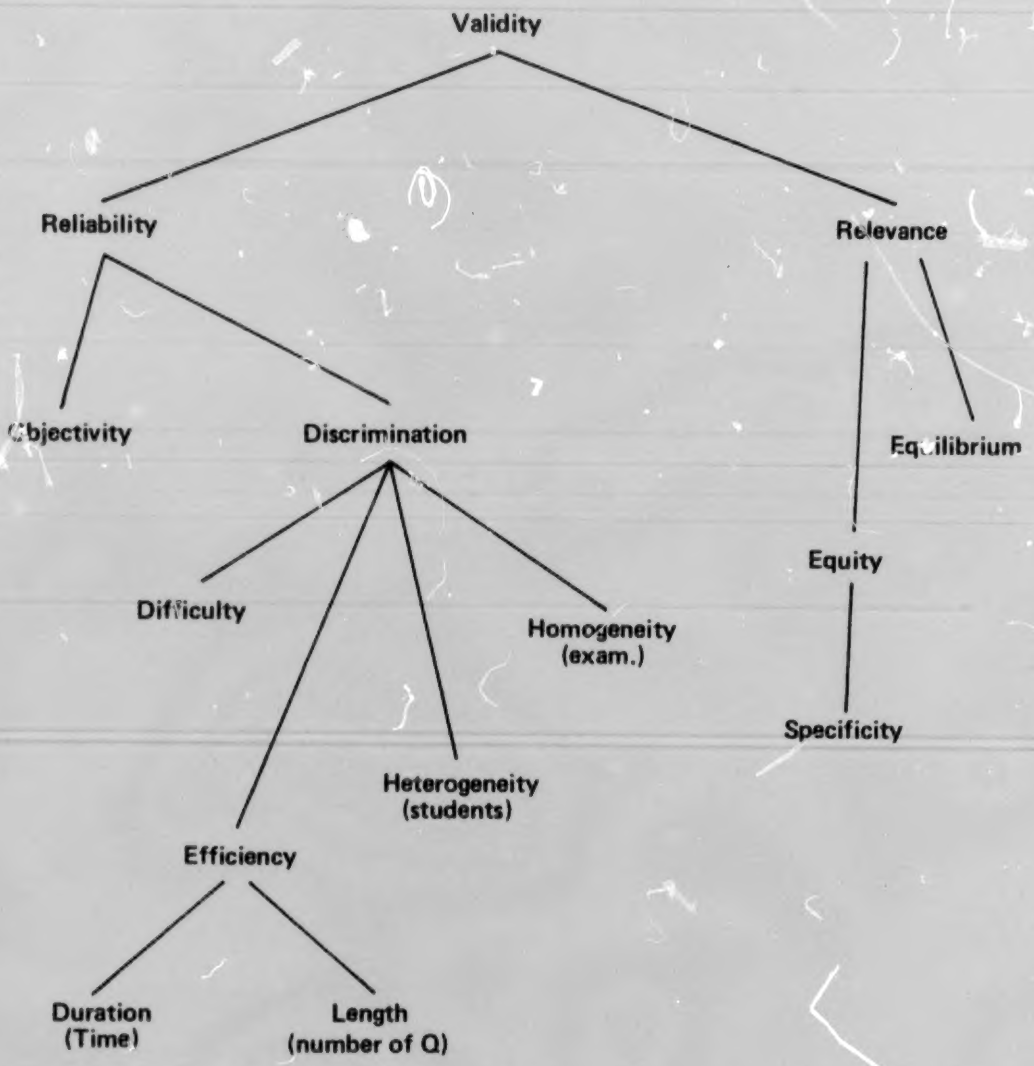
Reliability, discrimination, length, homogeneity (of questions) and heterogeneity (of students)

According to Ebel, reliability is influenced by the extent to which the questions (items) clearly distinguish competent from incompetent students, the number of items, the similarity of the items as regards their power to measure a given skill and the extent to which students are dissimilar with respect to that skill. The discriminating power of a question is directly influenced (see pages 4.60 – 4.61) by its level of ***difficulty***. The mean discrimination index of an instrument will also be affected by the **homogeneity** of the questions and the **heterogeneity** of the students. From the comments made above it can be seen how **equity** and **specificity** will also influence the discriminating power of the instrument.

EXERCISE

Try to answer questions 22 – 25 on p. 2.47 and check your answers on p. 2.48.

relationships between characteristics of an examination*


Validity
Reliability
Relevance
Objectivity
Discrimination
Equilibrium
Equity
Difficulty
Homogeneity (exam.)
Specificity
Heterogeneity (students)
Efficiency
Duration (Time)
Length (number of Q)

* as proposed by G. Cormier, Université Laval, Quebec.

N.B. Additional relationships to those suggested in this diagram can be established. The number of arrows has been kept to a minimum for the sake of clarity and to give a basic idea of the concept as a whole.

EXERCISE

For each of the educational objectives you defined on page 1.54, describe two methods of evaluation that seem suitable to you for informing yourself and the student on the extent to which that objective has been achieved. Compare the two methods on the basis of the three criteria shown in the table below.

OBJ	Make a differential diagnosis of anaemia based on the detailed haematological picture described in the patient's medical record.	Validity	Objectivity	Practicability
I	Modified essay question. A series of 10 short questions based on patient's record as supplied to student (1 hour).	+++	+++	+++
II	Student given patient's record (10 mins.) followed by 15 min. oral examination.	+++	+	+

Methods of Evaluation for a class of 200 students

OBJ	The student should be able to:	Validity	Objectivity	Practicability
I				
II				

Check the meaning of the words validity, objectivity and practicability in the glossary, page 6.01.

For evaluation
the essential quality is **validity**

but don't forget

that for an educational
system considered as a whole
it is its **relevance**
that is of primary importance

evaluation is a matter for teamwork

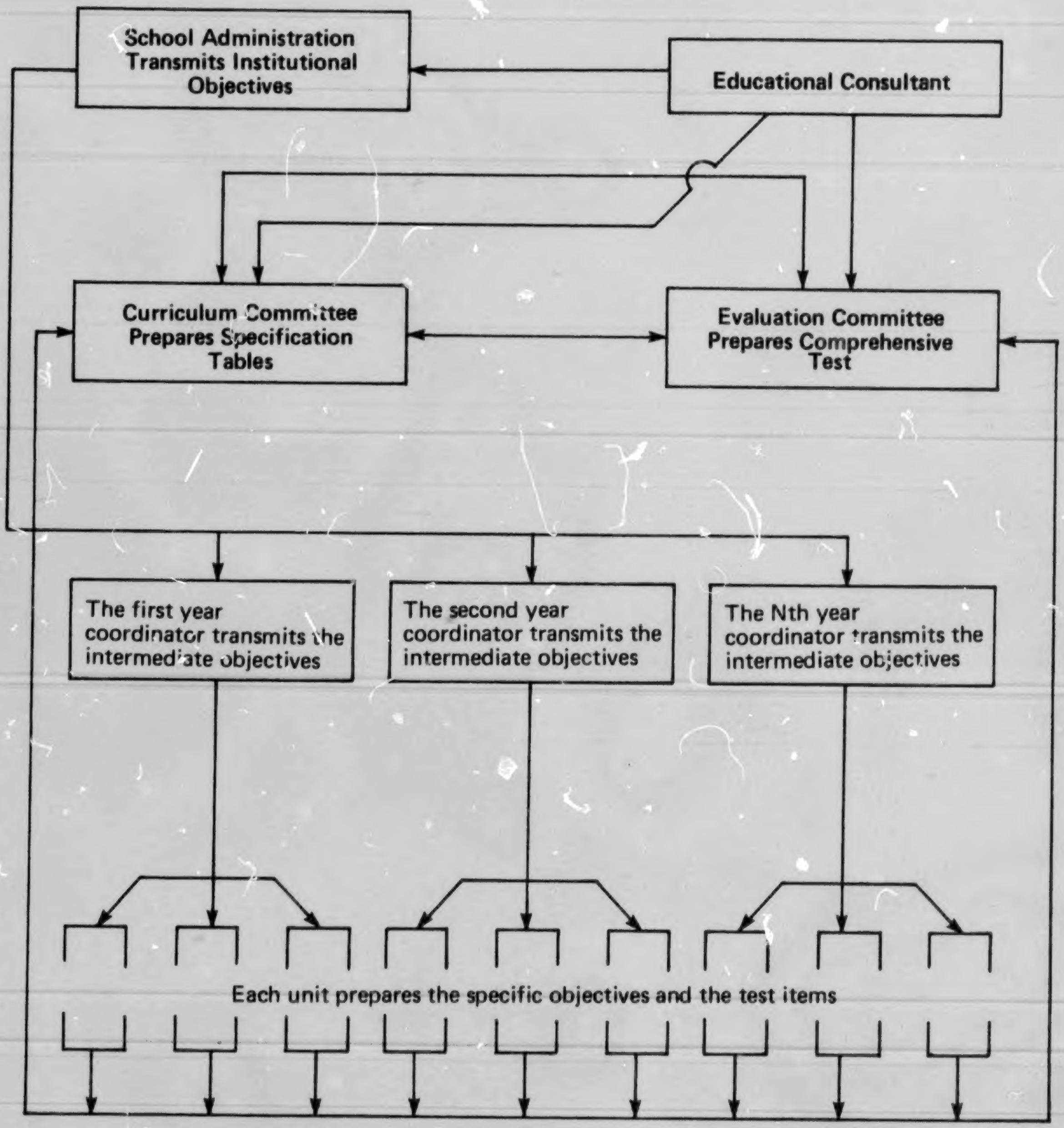
The planning of an evaluation system is obviously not simple. It is a serious matter, for the quality of health care will partly depend on it. It has been stressed many times, moreover, that it should be a group activity. We have stated in the preceding pages that evaluation must be planned jointly; that implementation of any evaluation programme is the responsibility of the teachers, in collaboration with students and the administration; that evaluation carried out jointly by a group of teachers is less likely to be erroneous than when carried out by one person; and, finally, that critical analysis of a test by colleagues is essential to its sound construction.

This work performed jointly by a group of teachers calls for a coordinating mechanism. The terms of reference of each group and group member must be defined explicitly and known to all. The institution's higher authorities must provide the working groups and their members with the powers corresponding to the task to be accomplished.

The diagram on the next page shows **one** type of organization and meets the needs of a given institution. Other types of organization can be envisaged, according to existing structures and local traditions.

Do not change anything that works satisfactorily . . . . what is satisfactory to some, however, is not necessarily good enough for others. Teaching is a matter for teamwork.

Organizational diagram showing relationships between curriculum committee, evaluation committee and teaching units


School Administration Transmits Institutional Objectives
Educational Consultant
Curriculum Committee Prepares Specification Tables
Evaluation Committee Prepares Comprehensive Test
The first year coordinator transmits the intermediate objectives
The second year coordinator transmits the intermediate objectives
The Nth year coordinator transmits the intermediate objectives
Each unit prepares the specific objectives and the test items

Personal Notes

Judge the consequence of the student's not achieving the objective by answering such questions as: "If he cannot perform the objective when he leaves my instruction he is likely to . . . . . ". The answer should help you decide how much energy to put into constructing a valid evaluation system to find out whether the objective is achieved as written.

R.F. Mager

EXERCISE

Show graphically the type of organization (commissions, committees, administrations, etc., *with a description of their functions*) which seem desirable (in the establishment where you are teaching) for introducing (or improving) an **evaluation** system capable of providing the necessary data for checking that all **educational** objectives have been achieved (do not forget also to take account of the **decisions** you have formulated on page 2.09); then compare with page 2.41.

EXERCISE

Describe the obstacles you are liable to encounter in applying the organizational plan you have imagined on the previous page and indicate tactics for overcoming each of these obstacles.

Obstacles	Tactics

EXERCISE

(Check your answers on p. 2.48)

Question 1

The main role of evaluation is:

Question 2

The purpose of evaluation is to make a value judgment concerning:

A. Students and programmes.

B. Students and teachers.

C. Programmes and teachers.

D. Students.

E. None of the above.

Question 3

Thorndike's "Law of Effect" is based on the fact that:

A. Students learn better when they are motivated.

B. Students learn better when they play an active role.

C. Students are receptive when they understand the educational objectives which have been defined.

D. Students tend to engage in activities which have success associated with their results.

E. Students work better if the teacher makes an impression on them.

Questions 4 to 8

Indicate to which of the following each question refers:

A. Formative evaluation

B. Certifying evaluation

C. Both

D. Neither

Question 4

Its main aim is to inform the student on his/her progress.

Question 5

Does not preserve anonymity.

Question 6

Enables the teacher to decide to replace one programme by another.

Question 7

Justifies the decision to let a student move up from the second to the third year.

Question 8

Permits rank-ordering of students.

Questions 9 to 16

For each of the aims of student evaluation (list numbered 9 to 16, p. 2.18), indicate whether the appropriate measuring instrument will be of the certifying evaluation type (C) or both certifying and formative evaluation (CF).

Question 17

The four steps of the process of student evaluation are as follows:

1.
2.
3.
4.

Question 18

All the following steps **except one** are essential in constructing any measuring instrument.

A. Precise definition of all aspects of the type of competence to be measured.
B. Obtaining reliability and validity indices for the proposed instrument.
C. Making sure that the type of instrument chosen corresponds to the type of competence to be measured.
D. Making sure, by an explicit description of the acceptable level of performance, that the use of the measuring instrument will ensure objectivity.
E. Determination of the particular behaviour expected from individuals who have or have not acquired the specified competence.

Question 19

When evaluating communication skills (domain of interpersonal relationships), all the following steps should be taken **except one**:

A. Describe specific types of behaviour showing a given affective level.
B. Describe explicit types of behaviour showing the absence of a given affective level.
C. Observe students in real situations enabling them to manifest the types of behaviour envisaged.
D. Obtain the agreement of a group of experts on the relationship between explicit types of behaviour and the affective level envisaged.
E. Obtain the student's opinions on the way in which they would behave in specific situations.

Question 20

The essential variable to be considered in evaluating the results of teaching is:

A. The student's performance.
B. The opinion of the teacher and his colleagues.
C. The opinion of the student regarding his performance.
D. The satisfaction of the teacher and the students.
E. The teacher's performance.

Question 21

Which of the following is not suitable for measurement by written examinations of the "objective" type:

A. Ability to recall precise facts.
B. Ability to solve problems.
C. Ability to make decisions.
D. Ability to communicate with the patient.
E. Ability to interpret data.

Questions 22 and 23.

If the following qualities can be attributed to an examination:

A = Validity B = Objectivity C = Reliability D = Specificity E = Relevance

Question 22

What quality is obtained if a group of experts agree on what constitute good answers to a test?

Question 23

What quality implies that a test consistently measures the same thing?

Question 24

The following factors, **except one**, generally affect the reliability of a test:

A. Its objectivity.
B. The mean discrimination index of the test questions.
C. The homogeneity of the test.
D. The relevance of the test questions.
E. The number of questions in the test.

Question 25

Which of the following test criteria is influenced by all the others?

A. Reliability.
B. Validity.
C. Objectivity.
D. Specificity.
E. Relevance.

Suggested answers for the exercise on pages 2.45 – 2.47

Question	Suggested Answer	If you did not find the correct answer, consult the following pages again
1	→	2.02 – 2.06
2	E	2.08
3	D	2.14
4	A	2.15 – 2.19
5	B	
6	C	
7	B	
8	C	
9	CF	
10	CF	
11	CF	
12	C	
13	C	
14	CF	
15	CF	
16	C	
17	→	2.20
18	B	2.21
19	E	2.07 – 2.35
20	A	2.08 – 2.21
21	D	2.27 – 2.31
22	B	2.34 – 2.35
23	C	
24	D	2.34 – 2.37
25	B	

programme construction

3

the teaching-learning concept and programme construction

This third chapter deals with the *planning of teaching programmes* and learning activities. It attempts to bring out the change which is now taking place, i.e. the tendency to be interested more in what the student receives, perceives and assimilates than in what the teacher presents, gives or does. It shows that this change can be of benefit to all (the teacher continuing to learn and the student taking over part of the teacher's role).

It deals with the teaching-learning *process* as part of a teaching-learning *system*. It stresses the effectiveness of methods which place the student in an *active* situation. It proposes a relevant and student-orientated plan of action taking into account the (traditional) obstacles to change.

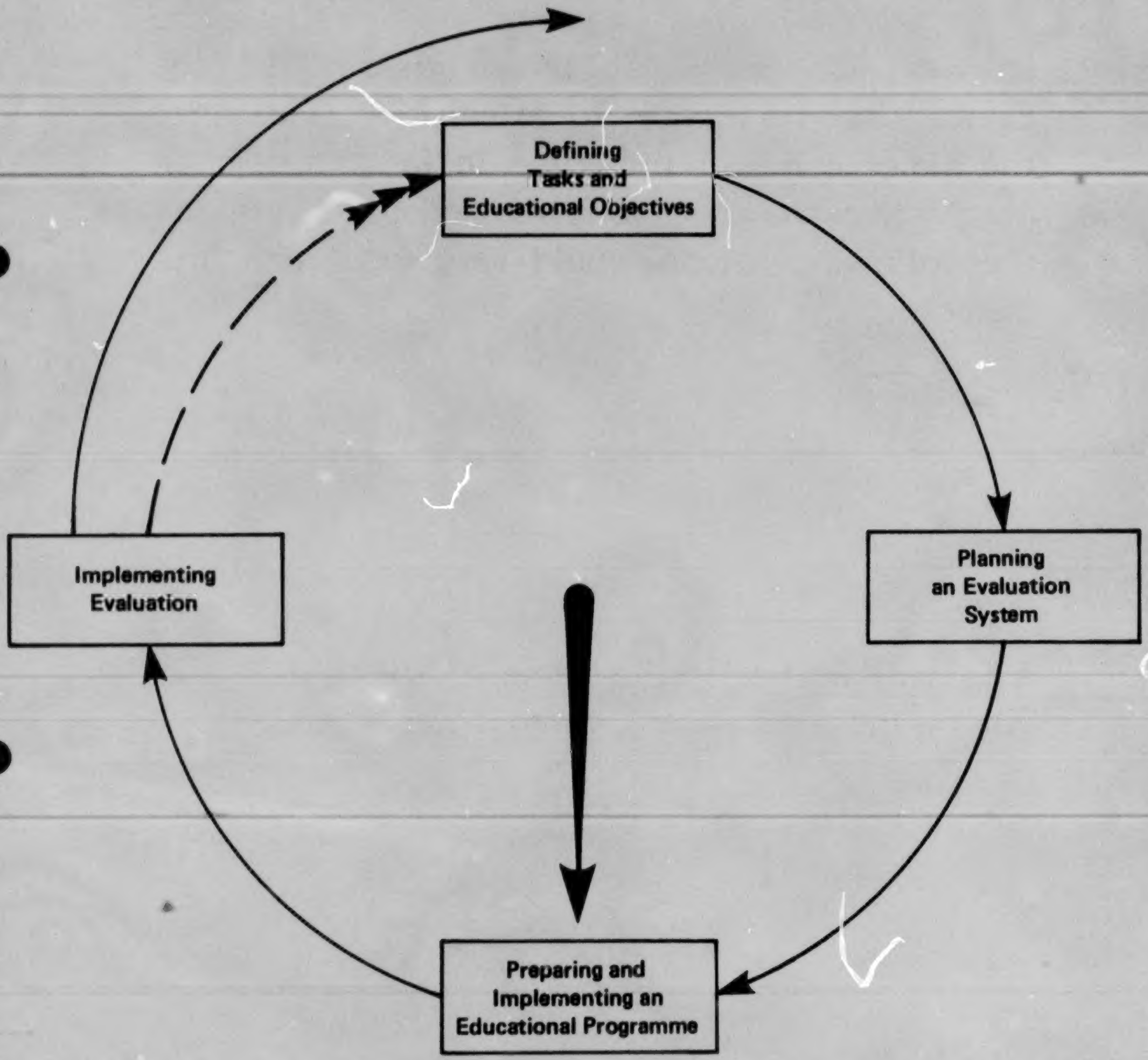
Those with a deeper interest in these problems are strongly advised to consult the following publications:

- Public Health Paper No. 52, WHO, "Development of educational programmes for the health professions", 1973
- Public Health Paper No. 47, WHO, "Aspects of medical education in developing countries", 1972
- Public Health Paper No. 61, WHO, "Educational strategies for the health professions", 1974
- Technical Report Series No. 489, WHO, "Implications of individual and small group learning systems in medical education", 1972
- Technical Report Series No. 521, WHO, "Training and preparation of teachers in schools of medicine and of allied health sciences", 1973

After having studied this chapter and the references mentioned, you should be able to:

1. Explain the differences between "education", "teaching" and "learning", and describe the new trends in the teaching/learning system and the various learning situations.
2. Define the concept of relevance of a programme.
3. List 10 conditions which facilitate learning and evaluate a learning activity.
4. Indicate the aims and general methods of teaching.
5. Specify at least two advantages and two disadvantages for each technique and medium used in teaching.
6. Select a teaching method that will make an educational objective easier to attain. Compare the alternatives in a specification table.
7. Indicate the steps involved in constructing a programme.
8. Construct a programme or decide whether a programme or course needs revision, using a specification table.
9. Construct a self-learning package.
10. Define the role which, as a teacher, you would like to assume in order to motivate and facilitate the learning of students for which you are responsible.
11. Identify the obstacles liable to be encountered in setting up a competency based curriculum geared to the health needs of the community, and describe strategies for overcoming them.

the educational spiral


Defining
Tasks and
Educational Objectives
Planning
an Evaluation
System
Preparing and
Implementing an
Educational Programme
Implementing
Evaluation

It was felt useful at this mid-point of the Educational Handbook to attempt to **summarize the major concepts presented so far** and place in perspective the two following chapters. We felt the following article would very well serve this purpose.

You will find later the name of the author and, what is more significant, **when** it was written.

distinctive attributes of education for the professions

Educational ferment characterises schools and colleges throughout the world. New responsibilities, new definitions of educational aims and new programmes are emerging at all levels of the educational ladder. At first glance, these new developments appear to have no common elements but to be highly individual, unrelated incidents of educational change.

It is helpful to *consider first the essential characteristics of a profession* and, second, the *major tasks involved in planning and conducting an educational programme*. In the light of these two factors, the significant elements of effective education for the professions can be seen more clearly.

A profession based on a code of ethics

From the standpoint of the education required, there are two essential characteristics of a true profession. The first is the existence of a recognised *code of ethics*. This ethical code commits the members of the profession to certain *social values above the selfish ones of income, power, and prestige*. In the case of medicine, for example, its code of ethics dedicates the doctor to the *saving of lives* and the *protection of the patient's health* above all material and personal considerations.

A professional code of ethics not only *professes social values* that are above selfish ones, but it expects the individual member seriously to *dedicate himself to these higher values*. Furthermore, a profession establishes some form of group discipline in support of these values. A doctor who violates the ethical code of medicine receives the disapproval of fellow doctors and is subject to discipline by the state for malpractice. One of the indications that an occupation is becoming a profession is a concerted movement among members of the occupation to establish and maintain *group discipline* in order to uphold the ethical values to which the group gives lip service.

A common problem in several professions is to distinguish ethical values that are broadly social from a pseudo-ethical code that in reality dedicates the individual to the selfish interests of the group rather than to mankind generally. In some programmes for the education of doctors, there has been a tendency to develop a code of ethics in which the doctor dedicates himself to the medical profession and to the interests of doctors rather than to the improvement of the health of mankind.

A profession is not a union. Professional ethics must focus upon higher social values than dedication to the selfish interests of the professional group. Yet to attain this high aim is one of the serious problems of the professions.

A profession based on principles

The second distinguishing feature of a profession is the basing of its techniques of operation upon principles rather than rule-of-thumb procedures or simple routine skills. For an occupation to be a profession it should involve complex tasks which are performed by artistic application of major principles and concepts rather than by routine operations or skills. This is an important differentiating feature. A skilled trade, obviously, involves some fairly complex tasks, but the members of the trade are able to perform these tasks through acquiring certain routine skills and through following certain specified rules. Many of the problems encountered by a member of a profession are in a certain sense unique. To solve such a problem he must draw upon certain basic principles. However, the application of these principles necessitates an analysis of the particular problem to see what are its unique aspects which will require adaptation of the principles. This adaptation is an artistic task; that is, *it involves individual judgement and imagination as well as skill.* A skilled trade does not demand this type of intellectual operation.

In the early days, surgery was not really a profession but was a skilled trade. Certain skills, such as those used in bone-setting, were transmitted from one generation of surgeons to another, and the surgeon learned largely as an apprentice how to carry on his trade. With the development of the basic medical sciences like anatomy and physiology, it became possible to gain a more fundamental understanding of what was involved in bone structure and in tissue development, so that a surgeon with adequate scientific background was able to adapt his particular procedures to the specific conditions surrounding a given case. He then solved the problem in each case in terms of basic principles rather than simply following rule-of-thumb procedures.

Whenever a member of any profession meets his day-by-day tasks in terms of routine performance, for him the occupation is no longer a profession.

A profession not only utilises basic principles rather than depending on rule-of-thumb procedures, but as it becomes more mature it recognises that the principles used in the profession must be viewed in an increasingly larger context and that, correspondingly, *the science needed by the profession must be continually extended to more basic content rather than restricted only to the obvious applied science*. Thus, increasingly has medicine come to recognise the interrelationship of nutrition, physiology, anatomy, biochemistry, and other fundamental sciences which give a much broader basis for *understanding a particular medical condition of a given patient.*

In general it can be said that as a profession becomes increasingly mature, it not only develops members who carry on their work through principles rather than rule-of-thumb procedures, but it also *encourages members to gain an understanding of these principles in a much larger context than that afforded by the usual confines of the occupation*.

I have emphasised these two major characteristics of a profession — the development of a code of ethics, and the use of techniques that are based on principles — both because they are the most significant differentia of professions from other occupations and because they help to indicate some of the fundamental tasks of professional education.

Tasks in planning and conducting an educational programme

Shifting our attention from the essential characteristics of a profession to the tasks involved in planning and conducting an educational programme, we find it possible to classify these tasks into four major types, namely:

- deciding on the objectives;
- selecting learning experiences that will contribute to the objectives;
- organising the learning experiences to maximise their cumulative effect; *and*
- evaluating the effectiveness of the educational programme in attaining its objectives through appraising the educational progress of the students.

Education is a process for changing the behaviour of students in desired directions. The term *"behaviour" is used in the broad sense and includes thinking, feeling, and acting*. When a student is educated he has acquired ideas, habits, attitudes, interests, ways of thinking, and professional skills which he did not have before he went to school; his behaviour has changed.

From this definition of education it is clear that the *educational objectives are the behaviour patterns that the school tries to develop in the student*. The knowledge, the skills, and the ways of thinking that the student is expected to acquire are examples of these objectives. The task of deciding on objectives is an important one because these are the aims and purposes which can and should be used to guide the entire educational programme. *The only rational basis for selecting learning experiences and devising evaluation procedures is in terms of their relation to the educational objectives.*

The second major task of education is to select learning experiences that will contribute to the objectives. This raises a previous question: how do people acquire these desired changes in behaviour patterns? *"People acquire them by practising them"* is a simple but fairly accurate answer. Getting students to practise the desired behaviour, however, is not the easiest thing in the world.

A student develops understanding by *recalling* ideas, by *explaining* them in his own words, and by *finding illustrations* of them. Skill in ways of thinking are developed by *practising problem-solving again and again*. Manual skills and habits are also acquired by *practice. An attitude is acquired as the student looks repeatedly at the phenomenon from a new perspective.* Interests are acquired by getting satisfaction from certain kinds of experiences so that the experiences become increasingly satisfying. For all of these kinds of behaviour, *students acquire new behaviour patterns by practising them.*

One fact clearly emerges from this analysis – *the teacher cannot learn for the student.* Whether or not the student develops an understanding will depend upon what is going on in his mind, not what is going on in the teacher's mind. *To plan learning experiences is to outline the activities that will give the students a chance to practise the behaviour implied by the* objectives. Thus, planning a particular course will mean *providing situations in which students will encounter problems to solve so that they can gain understanding and develop critical thinking.* Planning may also involve providing tasks which require the students to practise manual and intellectual skills and habits, and so on.

The third major task in education is to organise the learning experiences to maximise their *cumulative effect.* We can increase the cumulative effect of learning experiences in two ways: through sequential organisation and through integration. When learning experiences are arranged so that the students begin with simpler concepts and skills and go on to broader and deeper applications, far greater learning results than with a random arrangement of learning. This is *sequential organisation. Integration involves relating what is taught in one part of the educational programme to what is taught in another part.* Effective organisation of learning experiences involves *planning both for sequence and for integration.*

The fourth major task in education is to *evaluate the effectiveness of the educational programme in attaining its objectives, through appraising the educational progress of the students.* This requires *evidence of changes in students' behaviour* during the time they are taking part in the educational programme. *It means appraisal early in the course as well as near the end.* It involves *evidence relating to all of the important objectives which will* help us to *identify those aspects of the curriculum that are effective and those that need improving.*

With this brief review of the essential characteristics of a profession and the major tasks in planning and conducting an educational programme, we can identify more easily the distinctive attributes of education for the professions.

Objectives of professional education

The existence of principles and of a code of ethics in a profession points to several kinds of educational objectives which are important in educating for a profession. The development of an ethical practitioner who has an adequate understanding of the ethical code of the profession, who applies the ethical principles intelligently to the varied particular instances that arise, and who is sincerely committed to the highest ends of the profession, requires an education programme which consciously aims at several major types of objectives.

In terms of knowledge and understanding, a programme of professional education needs *to develop in students a broad and clear concept of the social role of their profession.* This includes understanding of the social functions the profession serves and how these functions are related to the total functioning of society and to the functions of other major specialised groups. It also includes an understanding of the various kinds of relations which exist between the profession and society at large and between the profession and other specialised groups, including the expectations which these groups hold regarding the members of the profession.

Also, in terms of knowledge and understanding, professional education aims at developing a deep *understanding of the persons to whom the professional service is rendered* including particularly insight into personal motivations, feelings, needs, and the interrelation of physical, psychological, social, and emotional aspects of human behaviour. Furthermore, professional education needs to include among its objectives the development of *self-understanding* in the students. Obviously, in no sense can complete self-understanding be attained by the time of graduation from the professional school, but a sufficient beginning can have been achieved *to provide for continued development* as he pursues his professional career.

In terms of effective thinking or problem-solving, the objectives of professional education which are derived from the importance of ethics include the ***ability to recognise ethical problems, the ability to identify the ethical principles at issue,*** and ***the ability to work out appropriate courses of action in terms of ethical principles.***

In terms of attitudes, education for the professions aims at developing loyalty to the social well-being of the persons who are served by the profession, concern for a truly social role on the part of the profession, a sense of self-respect for the social contributions of his profession and of his own work, and a warm, accepting, yet objective attitude towards his clients. This involves ***developing in professional students a considerable degree of emotional maturity so that they are free to express and receive emotionally charged communication and at the same time can act intelligently as new problems arise.***

The foregoing objectives clearly represent a large task for professional education, but these are not all the important objectives. The requirement that the professional practitioner operate on the basis of principles rather than rules implies certain additional objectives if the educational programme is to aim consciously to develop students who can operate in this fashion. Some of the purposes outlined above contribute to the ***performance of professional duties in terms of principles.*** In addition, in terms of knowlege and understanding there is need to ***understand the structure and functioning of the institution in which the profession operates,*** whether this be school, church, hospital, court, or other institution. Only with such a broad view can a professional practitioner operate with intelligence and on the basis of principles adequate to produce desired consequences.

Finally, of course, every professional school needs to aim consciously ***to develop an understanding of those principles, concepts, facts, and procedures which are basic to professional operations.*** In medicine these include principles of physiology, anatomy, chemistry, physics, bacteriology, and psychology. The tendency, however, is to limit these basic principles too narrowly. In a very real sense, doctors deal with problems in their normal professional work which are psychological and require an understanding of relevant psychological principles if they are to operate intelligently.

In terms of effective thinking of problem-solving, it is clear that the foregoing objectives involving knowledge imply ***the development of some skill in recognising professional problems, in analysing the problems in terms of the relevant principles, and in working out courses of action by applying these principles.***

In terms of attitudes, the use of principles, rather than rules, in a profession requires as objectives in professional education the development of broad, rather than narrow interests in the fields on which the profession draws, and the ***development of the student's interest in continuing his own learning long after graduation from a professional school.***

Planning learning experiences

The previous section outlines characteristic objectives of professional education. What about the learning experiences which the professional may use to attain these objectives?

The ***most common problems*** in professional schools in connexion with the learning experiences used are:

- the failure to select learning experiences in terms of the objectives to be attained;
- the failure to utilise consciously appropriate learning procedures for developing problem-solving skills, attitudes, and interests; ***and***
- the failure to develop effective motivation for learning.

These are serious deficiencies.

Since ***learning is an active process,*** in which the learner himself is definitively involved, ***motivation is essential.*** Since the learner learns more than knowledge of content, and ***he actually learns what he is doing, what he is feeling, what he is thinking,*** it is important to make conscious plans for students to learn to solve problems, to develop attitudes and interests. Since objectives represent the aims of the professional school and learning experiences are the means of reaching educational aims, the latter should be planned in terms of these aims.

An essential factor in planning learning experiences in terms of the objectives sought is to have clearly in mind what the objectives imply, both as regards behaviour to be developed and content involved. For example, if the objective "understanding the social functions the profession serves and how these functions are related to the total functioning of society and to the functions of other major specialised groups" is to serve as a guide for planning learning, ***we must have a clear idea of what is meant by "understanding"*** as a type of behaviour to be developed and what content is included in the phrase beginning "the social functions the profession serves". Most instructors who have sought to define "understanding" indicate that it is a mental process that is more active than memorisation, since it involves not only ***remembering*** but also the ability to explain the concept or principle in one's own words, the ability to ***interpret***, to ***illustrate***, and to ***compare*** and ***contrast*** it to related ideas. Such a definition clarifies the behaviour that the student is expected to develop and, as pointed out earlier, it suggests the kind of learning experiences that are required to attain the objective. These would be ***learning experiences which give the student opportunity to explain, to interpret, to illustrate, and to compare and contrast it to related ideas.*** By defining the content implied by the phrase beginning "the social functions the profession serves", we are able to identify what the principles and concepts are which the students will be given opportunity to explain, to interpret, to illustrate and to compare and contrast with related ideas.

Correspondingly, ***as we define each objective in terms of the behaviour and content implied, it is a much easier step to select learning experiences*** that give students a chance to practise the behaviour involved and to utilise the relevant content. In this way, learning experiences are planned in terms of the objectives sought.

The fairly common practice in professional schools of giving almost exclusive attention to knowledge and to technical skills may be partly due to the failure to recognise that effective thinking, attitudes and interests are also learned and can be consciously developed in programmes of professional education. Skills in ways of thinking are acquired by practice of solving problems. A new attitude is acquired by repeatedly observing and reacting to certain phenomena from a new perspective. ***Interests in certain kinds of activities are developed as the student gains satisfaction from participating in these activities.*** For each of these types of objectives, definite learning experience can be provided so that students are practising problem-solving, they are projected into situations from a new perspective, they are able to gain satisfaction from certain kinds of activities. In short, professional schools can plan learning experiences for developing effective thinking, attitudes and interests.

This leads to consideration of the primary significance of motivation. Since the learner learns through his reactions, unless he can be involved in the situation, unless he can be guided to think, feel, and act in ways appropriate to the situation, it is not possible for him to learn. ***Practice alone, even when carried to unusual limits, does not take the place of the learner's being involved in what he is doing.***

Organising learning experiences

There are not only problems involved in the selection of learning experiences but also in their organisation. As the programmes of professional education have become more complex and involved larger staffs, they have become more disintegrated. Yet significant changes in behaviour, that is, fundamental learnings, require a long time to develop. It is necessary that what is learned this term builds upon what was learned last term, that what will be learned next year builds upon what is learned this year. This is sequence learning.

However, effective sequence is not simply a series of repetitions from one year to another. Rather, it includes ***variety in the learning experiences, so that each subsequent term emphasises the main things to be learned, but in varied contexts.*** In this way, ever broader and deeper learnings are achieved.

Furthermore, effective organisation provides for relating one course to another and one field to another, which reinforce the learning in each course or field. This is done both by *helping the student to use things learned in one course or field in another, and by helping him to perceive differences as well as similarities in the concepts, principles, attitudes and skills utilised in the various courses and fields*. This is called curriculum integration.

Sequence and integration are essential to programmes of professional education, but because of the tendency towards specialisation and separation, conscious efforts are required to plan for and develop effective organisation.

One significant development in working out a better organised curriculum is the building of a closer and more appropriate connexion between theory and practice, between the art and the science of the profession. Many institutions are not only teaching general principles but also helping students to apply these principles to particular cases *so that it is possible for them in practice to use the principles as they deal with particular cases.* Effective professional education requires this close connexion between theory and practice. Without theory, practice becomes chaotic, merely a collection of isolated, individual cases. Theory gives meaning and unity to what would otherwise be specific and isolated cases.

On the other hand, without practice theory becomes mere speculation. The realities of practice provide a check upon pure speculation, a test of the adequacy of theory; and practice provides the problems which must be dealt with by any comprehensive theory. Hence these *efforts to connect theory and practice more closely are important contributions to professional education.*

Another illustration of this development is the *increasing use of the case method*. The case method involves the student in the study of a conrete and particular case. However, for him to understand this case and deal with it effectively, he must bring to bear the theory, the concepts and the principles that are basic to the issues raised by the case. The internship provides concrete experiences which are interpreted in terms of basic theory in the accompanying seminars. This shuttling back and forth between general and specific aspects of a profession helps to build an increasingly adequate context of concepts and principles by which a member of the profession can understand the operations to be performed in relation to the values to be attained. An adequate theory helps him to relate particular activities in an individual case to the larger social issues, to see the connexion between the activities of the daily operations of the profession and the welfare of society generally.

However, for these types of educational programmes to be effective, more than superficial experience and explanation must be provided. The student needs many opportunities *to deal with situations on the basis of a careful analysis of them, to identify the values and* principles involved, and *through practice to develop artistry in devising means to deal with the situation in order to preserve these values*. This is the aim of efforts to knit theory and practice more closely together.

Another effort at extending the sequential organisation of professional education is the *working out of definite plans for continuing education after the member of the profession has completed pre-service training and has been inducted into the initial activities of his work.* Fifty years ago medical schools felt that their work had been done when their graduates had been admitted to initial professional activity. As the years went by it became increasingly clear that many members of the profession did not grow after they began their work and that in some cases the older practitioner was much less competent than those currently beginning their profession. Few doctors made any effort to continue their education after graduation.

Now there is a marked tendency for professional schools to develop programmes of continuing education, in some cases bringing the work of the school to the practitioner in the field, in other cases setting up short courses, institutes, or long-term seminars for practitioners to take on the campus.

Evaluating effectiveness of educational programmes

The final attributes of professional education are those involved in the task of *evaluating*

the effectiveness of the educational programme in attaining its objectives, through appraising the educational progress of the students. Four important attributes are too often neglected in current educational programmes.

The first of these is ***conducting an appraisal in terms of all of the important educational objectives of the professional school***. The common practice is to appraise the knowledge of the students and certain of their technical skills. In addition, many professional schools appraise the student's ability to solve problems as these are presented in verbal form. Few institutions provide for careful, systematic appraisal of problem-solving in the professional situation, and appraisal of professional interests and attitudes. Hence the school does not have a comprehensive picture of the achievements of its students in terms of its own purposes.

A second attribute, often neglected, may partly account for the shortcomings in the first. A comprehensive programme of evaluation uses ***varied devices*** for obtaining evidence regarding the educational progress of students. These devices include not only written tests and examinations, useful as they are, but also observations, interviews, questionnaires, reports from the field and samples of the student's work; in short, any device which gives valid evidence regarding the significant behaviour of the student. Few professional schools consistently evaluate their effectiveness in such varied ways. They tend to limit their appraisal to written examinations and to rating forms. This does not provide adequate means for comprehensive evaluation.

Appraisal of the progress of students toward the objectives of professional education requires evaluation at several points in his career. This is a third essential attribute. To get evidence of progress requires at least three appraisals, ***one early in his attendance*** at the professional school, ***one near his graduation***, and ***one after several years of service in the profession***. Some schools attempt annual appraisals during the student's enrolment. The changes made while in the school throw light on the immediate effectiveness of the school's educational programme, while the appraisal after the student has spent several years in the profession provides evidence of the permanence of learning and the extent to which it has achieved some continuity with professional experience. Unfortunately these studies of progress are quite rare. This may be partly due to the lack of appreciation of the way in which systematic sampling of students and alumni is small enough to permit the use of individual interviews yet at the same time sufficiently representative to permit valid generalisations regarding the populations from which the samples were drawn.

The last attribute to be mentioned here is ***the use of evaluation in improving the educational programme as well as in providing information to guide work with individual students***. Too often, what little appraisal of student achievement is conducted results only in grades for the students. Actually an evaluation programme can serve as a helpful means for continued improvement and development of the professional school. The results of appraisal indicate the respects in which students are making substantial progress and the respects in which expected development is not taking place. These suggest aspects of the educational programme which need re-thinking and re-planning to provide for improvement. Furthermore, as revisions are made in the programme, subsequent evaluation indicates the relative effectiveness of these revisions. Hence, ***appraisal provides a sound basis for planning***.

The evaluation data also indicate the progress made by individual students and bring to attention both their strength and their difficulties. This information thus provides a sound basis for the guidance of individuals and gives a more substantial foundation for the individual student's continued planning of his own education.

In summary, the distinctive characteristics of a profession, namely its ethical code and its operating basis on principles, suggest the distinctive attributes of education for the profession. From these characteristics, important educational objectives can be derived. Because these objectives are complex and involve understanding, problem-solving, attitudes and skills, they require clear definition in order to develop effective methods for their attainment. The difficulty of attaining the goals of professional education makes motivation of prime importance and effective organisation of learning experience a necessity. Finally, a comprehensive evaluation programme is required to guide the continued development and improvement of the educational programme and to provide information for constructive work with individual students. ***The building of an effective programme of education for a profession is not easy but when attacked intelligently, systematically, and enthusiastically, it can be done.***

* * *

The author of the preceding pages* is Ralph W. Tyler. He obtained his doctor's degree from the University of Chicago in 1927 . . . *more than half a century ago!* He wrote these lines in 1951 . . . *more than a quarter of a century ago!* yet his vision is still valid today and still remains to be acted upon.

* * *

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For those concerned in curriculum planning this clearly means that the order of the day is *patience and perseverance*.

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*The paper was presented on 30 January, 1952, in New York at the Annual Meeting of the American Association of Schools of Social Work and printed in the *Social Work Journal*, April, 1952.

programme describes

- a series of planned educational activities a student is to go through with the assistance of teachers

integration (of a curriculum)

- coordination of different teaching/learning activities to ensure the harmonious functioning of the educational process for more effective training

the four c's of curriculum planning

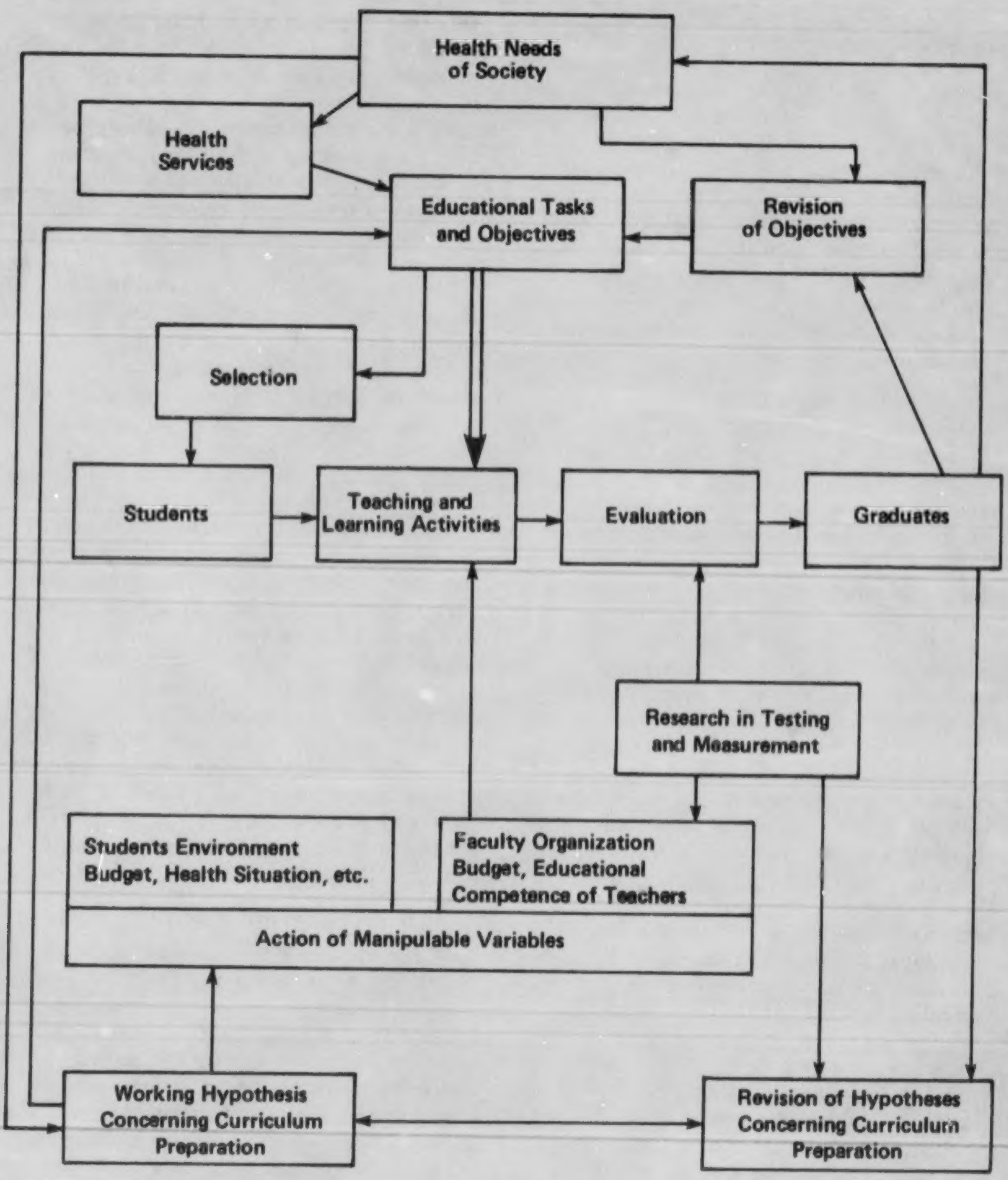
cooperative	A programme prepared jointly by a group of persons will be less liable to error than one prepared by a single person.
continuous	The preparation of a programme is not a one-shot operation. In planning it, provision should be made for its continuing revision.
comprehensive	In an approach which accepts the interaction of all the programme components must be defined with the requisite precision.
concrete	General and abstract considerations are not a sufficient basis for drawing up a programme. Concrete professional tasks must constitute the essential structure of a relevant programme.

from E. Krug.

plan of action for preparation of a teaching programme

Chronological order	Definition of objective	Executing body	Advisory body
1	Prospective study to evaluate the country's requirements (quantitative and qualitative) in respect of health personnel, taking into account what is available and can be absorbed	Ministries of Planning, Health, Education, etc.	University staff, national and international experts
2	Definition of the educational objectives of the school of health sciences in accordance with the tasks to be accomplished by each professional health worker	Ministries of Education and Health	Special faculty commission
3	Organisation of an information group on education planning for health sciences	Faculty staff	Faculty of **Pedagogy**, Education consultant
4	Acceptance by the faculty staff of the goals established in the light of the country's requirements; training of teachers in education planning		
5	Development of a system of evaluation: ■ certifying tests ■ continuous formative evaluation indicating whether the goal has been attained	Evaluation committee	Department of Education Education consultant
6	Modification of teaching programme and selection of methods by which to attain the goals	Programme committee	Faculty of Pedagogy Education consultant
7	Organisation of a group for research in education	Faculty staff	Faculty of Pedagogy
8	Periodic re-evaluation of goals and methods in response to changes in the country's needs and in the light of evaluation	Ministries of Planning, Health, Education, etc.	University staff, national and international experts

Diagram showing factors influencing curriculum design


Health Needs of Society
Health Services
Educational Tasks and Objectives
Revision of Objectives
Selection
Students
Teaching and Learning Activities
Evaluation
Graduates
Research in Testing and Measurement
Students Environment Budget, Health Situation, etc.
Faculty Organization Budget, Educational Competence of Teachers
Action of Manipulable Variables
Working Hypothesis Concerning Curriculum Preparation
Revision of Hypotheses Concerning Curriculum Preparation

3.17

the purpose of teaching is to facilitate learning[1]

The literature on the philosophy of education is rich in theories, which tell a story of timid steps forward, backward leaps and rediscoveries. It would be very gratifying to have a reliable general theory, firmly seated on a scientific basis and making proper allowance for social variables, which could serve as a guide for every teacher and enable him to resolve the "real" problems of teaching the health professions. Unfortunately, such a universally satisfactory general theory does not exist. On the other hand, by means of the ***systematic approach suggested, hypotheses can be formulated regarding the process of acquiring a satisfactory level of performance that can be evaluated empirically and the choice of learning activities facilitated.***

The contemporary trend is to stress the "teaching-learning system" as opposed to the preponderance previously given to teaching alone. There is a tendency ***to be interested less in teaching than in learning, less in what the teacher presents and more in what the student learns.*** Lawrence M. Stolurow has criticised what he calls the "communication-learning fallacy" which assumes that the information transmitted to the student is *always* learned. Doubtless this is obviously fallacious, and known to be so when it is expressed so crudely, but discussions of teaching methods are often still inspired by it and it has even been carried over into the initial stages of research into new methods. Much of this research, by concentrating on problems of the presentation of stimulating materials and utilising some of the more rudimentary concepts of communications theory, ***dealt too much with the manner in which information was transmitted to the student without investigating very closely what was learned and by whom, at what speed and, in particular, for what purpose.*** Understandably, this approach led to a passive attitude towards students' response; the student was seen in a dependent situation, relying upon information directed at him, whether through modern audiovisual communication techniques or the more traditional forms of the lecture and the text book.

Learning, however, is a dynamic and interactive process in which the behaviour and experience of the student are vital components; the student must not only receive but also contribute; his perception of what is happening is just as important as the perception of his teachers and ***the assessment he makes of the value of a learning activity may be more relevant than that of his examiners.*** Good conventional teaching, of course, has always sought to take account of the learner, but its structure and methods have greatly inhibited it. The rigid style imposed by large numbers, timetable requirements and the availability of teaching space, by the conventional practices in designing courses and by teaching conforming to an accepted academic discipline, have led to the "teaching" aspect again dominating over the "learning" aspect. If it is accepted that the starting point must be the ***acquisition of knowledge rather than its communication*** then we must ask some different questions and intensify our investigation of ***non-directive*** methods. Using the same approach as Jerome S. Bruner we can consider what experiences will motivate the student and enable him to learn, in what ways knowledge can best be structured for a given student or group of students, what sequence and in what form the material can be presented most effectively, what should be the nature and the frequency of rewards or penalties, and how we can gradually lead a student to give less thought to extrinsic rewards than to the personal satisfaction of having achieved a desired degree of skill.

The body of knowledge possessed by a group of teachers or set out in a series of authoritative volumes is the fruit of intense intellectual activity. Teaching a so-called basic science is not a matter of getting the student to memorise it, but rather of helping him to participate in a process that renders the acquisition of a body of knowledge possible. A subject is taught not to produce little living libraries on that subject but rather to get the student to think for himself in accordance with the laws of physics, to consider problems from the same angle as the biologist and to assimilate the process of acquiring knowledge. Knowing is a process, not a product.

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[1] **Adapted from Norman Mackenzie et al. *Teaching and learning*, Paris, UNESCO, 1970, pp. 44–50.**

If the revision and renewal of the programme is regarded as part of the teaching-learning process, a change must also occur in the roles and interrelationships of teachers, students and others who are concerned. The system becomes much more complex than the conventional linear model and it demands much more from those who have to design, manage and operate it. To put it epigrammatically, ***the teacher becomes a learner himself, and the learner undertakes some part of the teaching role***. This is because the teacher learns more about teaching and the student begins to assume a greater responsibility for his own progress. The roles of other participants also change and new roles must be added to the old. Some of the new methods at present under trial, for instance, not only require librarians to emerge from their traditional sphere into a more dynamic type of activity; they also call for the services of highly qualified personnel, such as artists, photographers and technicians, as well as educational technologists and psychologists. In fact, ***the ecology of a teaching institution changes once its primary function is redefined,*** namely to facilitate the acquirement of competence by the student.

□ □

In the following pages a certain number of definitions, epigrams and lists are proposed whose aim is to serve, where appropriate, as a starting point for reflections or discussions on the methodology of education. These elementary concepts are derived from various systems, and none of them is regarded as embodying an absolute and final truth.

□ □

□ □

Always assume that a teaching activity is ineffective unless there is evidence to the contrary.

Adapted from A.L. Cochrane

□ □

teaching

Interactions between **teacher** and **student** under the teacher's responsibility in order to bring about **expected changes** in the student's **behaviour**.

purpose of teaching

to help students to

- acquire, retain and be able to use knowledge
- understand, analyse, synthetize and evaluate
- achieve skills
- establish habits
- develop attitudes

teaching approaches

- talk to students
- talk with students
- have them talk together
- show students how
- supervise them
- provide opportunities for practice

S. Abrahamson

> Teaching methods which place the student in an active situation for learning are more likely to be effective than those which do not.
>
> G.E. Miller

* * *

The activities composing a training programme must be organized so that students can acquire their professional skills under conditions similar to those in which they will later practise.

* * *

* * *

If only ideal or model learning situations are used, the student will be deprived of the stimulus of having to face realities and will have less opportunity to propose improvements with the help of his fellow-students and his teachers.

* * *

* * *

Learning is both an emotional and an intellectual process.

* * *

learning

A process resulting in some **modification**, relatively permanent, of the way of

thinking,

feeling,

doing,

of the **learner**.

3.25

the characteristics of learning

learning is

- producing a behavioural change in the learner
- leading to a relatively permanent change that is also gradual, adaptable and selective
- resulting from practice, repetitions and experience
- not directly observable

3.26

some principles of learning

- learning is individual
- motivation is the key
- relevance of learning experience should be clear to the student*
- "feedback" to learner is important

* see paragraph 2 page 2.14

conditions to facilitate learning

An atmosphere which

- encourages people to be **active**
- emphasizes the **personal** nature of learning
- accepts that **difference** is desirable
- recognizes people's **right** to make mistakes
- tolerates **imperfection**
- encourages **openness** of **mind** and **trust** in **self**
- makes people feel **respected** and **accepted**
- facilitates **discovery**
- puts emphasis on **self evaluation** in **cooperation**
- permits **confrontation** of ideas

G.P. Pine & P.J. Horne, Principles and Conditions for Learning in Adult Education – Adult Leadership. Oct. 69

learning

- is primarily controlled by the learner
- is unique and individual
- is affected by the total state of the learner
- is cooperative and collaborative
- is an evolutionary process
- is a consequence of experience
- is not directly observable

G.J. Pine & P.J. Horne (ibid.)

EXERCISE

1. Complete in less than five lines the following sentence:

"I learn best when I ____

____

____

____

2. Ask several of your colleagues to do the same exercise; make a list of all the situations.

In the educational institution to which I belong, the following learning situations are provided for students:

3. Note the diversity of situations and compare it with those provided for students by the educational institution to which you belong.

4. If the comparison shows that changes are needed in your institution, read the following pages which describe the teacher's functions, and do the exercise on page 3.39.

teaching: a complex but challenging task

The teaching of health personnel has become more complex than it used to be, especially if it is accepted that the teacher should consider the benefit of the learner and not only his own satisfaction. More than a dozen of the teacher's functions are described below. A teacher should feel satisfied if he fulfils only a few of them, because the present educational environment does not greatly help him along this road. Nevertheless, he will do well to improve his performance by training as an educator.

It is sometimes thought that a teacher's activities are so intricately related to the local culture in which he functions that the description of his tasks should differ if he teaches in Antwerp, Dar es Salaam or Leningrad. However there is no support for this concept in reality. Data concerning teachers' behaviour during teacher training workshops organised by the World Health Organization over the last 10 years with participants from a great variety of geographical or socio-political backgrounds clearly indicate that teachers are more like each other than they are like the people of the community to which they belong. The worldwide academic community seems to be one cohesive entity modelled on nineteenth century Western European concepts of academic freedom, exclusiveness and detachment.

Most teachers in schools for health personnel conduct scientific research, write reports and articles, plan and supervise laboratory or clinical units and, finally, teach, in that order of priority. To teach means, in most instances, to prepare and deliver lectures, to supervise students during laboratory and clinical work, to decide which questions should be asked at examinations, and to score papers and oral examinations. Added to all this is attendance at numerous scientific or administrative meetings.

Instructional duties are sometimes called "teaching load", an expression which clearly conveys the attitude to that function. Teaching staff are jokingly depicted as secretly believing that academic life would be much easier if there were no students. As in all jokes, there is much truth in this.

Some teachers are seldom seen by students while others spend many pleasant hours in stimulating discussion with their students.

Rather than pursue this description, in which no teacher would ever want to recognise himself, let us consider what are the teacher's functions in the light of present-day educational concepts.

1. To be available

The teacher should be available to give students constructive criticism of their working objectives and methods. The key-word here is "available". It contrasts sharply with the habit of the traditional academician who proclaims "I am always happy to meet students . . . my door is always open", but who, in fact, is so rarely in his office that only very stubborn and highly motivated students manage to catch him once he has left the lecture hall. Really available is the professor who has a notice on his office door saying "I am at the disposal of students in this office every Tuesday and Friday from 10 to 12 a.m.", and who is actually there at those times.

2. To provide constructive criticism of learning objectives and methods

It is of the utmost importance that the student's working objectives and methods should be exposed to constructive criticism as, after training, health personnel should be able to relate their own professional goals to the organised system of health care, and to develop their own tactics for achieving those goals.

It is also important to develop the student's desire to seek criticism, supervision and advice from teachers and fellow-students.

3. To analyse and evaluate health problems

Generally speaking, clinical teachers are able to guide students in solving patients' particular problems, but students should also collect and use relevant information for the solution of community health problems. It is less certain that all teachers have enough understanding of epidemiology and of health manpower planning principles and methods to assist students in that respect. This is especially true of teachers of the so-called basic science subjects.

It would be an advantage if all teachers had sufficient competence to ensure that whatever they teach is relevant to the community health situation. The teacher should be able to analyse and evaluate health problems raised by students, as well as proposed solutions.

4. To define learning objectives

The teacher should be able to define the abilities that students need to acquire in order to solve a given health problem. For example a teacher should be able to define explicit and relevant learning objectives so as to help students to understand a problem. Moreover, when programmes are being constructed, it is preferable to indicate clearly the standard of performance to be acquired by students than to state only the amount of time to be spent teaching the subject. It is well known that the time needed to master a subject varies from student to student depending on his ability, motivation and drive, and on the availability of teachers and educational facilities. What is important for the average person is not the length of time during which teachers teach or students learn, but the ability of the person providing health care to perform a given task. If my son needs a hernia operation, I do not wish to be told that the surgeon has graduated from a six-year course in an institution in the WHO *World Directory of Medical Schools*. What I want to know is whether he is competent to perform that operation in the best and safest way. As for the nurse who will comfort him in this strange and frightening hospital world, I do not care whether she has had 72 hours in a psychology course as long as she is able to give him the reassurance he may need.

5. To assess students' work

The teacher should be able to define criteria for assessing students' work and measuring their abilities. Such criteria need to be carefully drawn up, and teachers should share the task of preparing them with their students. The sad state of most examination systems in faculties and schools is largely the result of the absence of such criteria, which could serve not only for certification purposes but also in guiding the students' learning, a point that is certainly no less important. Everybody in the health professions should cultivate this ability to define criteria, as it is essential that they should be able to audit their own performance and that of their colleagues.

6. To prepare learning aids

The teacher should prepare learning aids and materials, provide information that will facilitate students' independent work, and evaluate the usefulness of such materials. Most of what is usually transmitted by traditional lecture courses could be better acquired by students working independently and studying books, scientific journals and duplicated texts in self-learning format, with or without audiovisual aids. In such cases, students should be aware of related learning objectives, and feedback evaluation exercises, based on those objectives, should be available.

The preparation of such materials may well be a joint effort among colleagues from several faculties. It calls for a lot of work, but may be considered as an investment that will pay off during several years through setting up banks. It should help to eliminate passive learning which is often all that is required of students. The assessment of the usefulness of such materials, which requires a level of educational competence some teachers do not yet have, may call for the collaboration of specialists in education.

7. To select professional activities for students

The teacher should select professional activities of graded difficulty appropriate to the student's level of progress during the whole of his learning curriculum. There is agreement among professional educators that students should acquire professional competence through the practice of real (or, if that is not possible, simulated) professional activities. Even students fresh from secondary school are perfectly capable of drawing valuable lessons from the study of real cases.

8. To confront students with new problems

The teacher should confront students with a diversity of new problems in order to help them define the terms of the problems and find solutions to them. If it is true that the estimated half-life of medical knowledge is about five years, and is slowly but constantly shrinking, it is absolutely essential that today's graduates, among whom are tomorrow's leaders of health services, should be able ***to solve the new problems that arise in new situations***. It is here that the basic sciences have an important role to play as they can help the student to acquire a scientific method of inquiry. Such an approach is essential to keep knowledge and skills up to date. The fact that the graduate will have to replace much of what he knows is the least part of the problem; the main difficulty is that we, the teachers, do not know which half.

9. To develop problem solving skills

The teacher should facilitate students' learning by asking questions requiring problem solving skills rather than simple recall of facts. Even the most traditional teacher will agree that students ***must acquire basic skills***, either manual (e.g. inserting an intravenous drip) or intellectual (e.g. taking a history), should behave in an appropriate manner with the patient and his family, and should ***not merely possess theoretical knowledge***.

In spite of this, whenever the final examinations used in faculties and schools are analysed, it is found that a majority of the questions test only simple recall and not the intellectual skill of interpreting data and solving problems. No attempt is made to measure practical skills and attitudes. The fact that most examinations require students to recall facts without recourse to books is highly significant. Of course, health personnel must possess a large amount of knowledge that they can call upon without reference to books, otherwise their usefulness in an emergency situation would be seriously impaired.

Teachers should therefore test students on their ability to recall those facts that will be needed immediately in emergencies and have been clearly specified as such from the start. Apart from this, examinations should confront students with typical individual or community health problems and allow them access to books, in accordance with the sound practice adopted in everyday professional life.

10. To aid the understanding of basic scientific principles

The teacher should endeavour to ensure that students understand the basic principles underlying the activities and tasks they are learning to master. Factual details can be readily added to an understanding of basic principles and concepts, but such principles are not easily derived from a mass of facts. Students usually learn the so-called basic sciences early in the curriculum before they have met the real-life problems which require an understanding of those subjects. They are thus poorly motivated and soon forget what they have learned. It has repeatedly been found that students tested 18 to 24 months after having followed a basic sciences course answered at random, just as if they had never studied the subject.

11. To supervise the student's progress

The teacher should check each step the student takes in solving health problems in order to discover the areas where he fails to take account of the relevant basic scientific principles. This role follows naturally from the previous one. As mentioned above, in the traditional curriculum students are taught basic sciences in the first two or three years. Ideally, a student should be helped to reach an acceptable solution to problems through his understanding of the principles of the basic sciences and by adopting a scientific approach. One of the persons best qualified to judge whether the student is thinking in a scientific manner is the basic sciences teacher. In the training of a nurse or of a general practitioner, for example, the role of the basic sciences teacher is not to instruct in a given subject but to ensure that the nurse and the physician are capable of applying basic scientific principles in their daily work.

A physiologist could spend two hours a week in a ward or an outpatient clinic with his students, going through the medical records of current patients to check whether basic principles had been adhered to, and draw the students' attention to unsatisfactory examples. Such an association between basic sciences and clinical activities would be of greater value than the present so-called integrated forms of teaching in which teams or panels of teachers endeavour to teach in a coordinated manner.

12. To identify the factors underlying health problems

The teacher should make sure that the student identifies and takes account of the psychological, cultural and socioeconomic factors underlying the health problems with which he deals.

In practice, there is no natural frontier between the physical sciences and the humanities, nor between science and art in the broadest sense of the words. Giving courses in the humanities and the behavioural sciences does not automatically ensure that future health workers will be able to relate their daily activity to the culture to which they belong. They are more likely to do so if they are required in practice to define the patient's social and psychological problems in relation to his health problems, and to seek solutions, with the help of suitable specialists.

13. To encourage intellectual discipline

The teacher should encourage intellectual discipline by observing students' work and evaluating their activities in relation to defined standards of quality of care.

Both teachers and students pass much time, more or less usefully, in large lecture halls. A better distribution and use of teachers' time, and the practice of peer-teaching to enliven the course, could improve both the quantity and the quality of the instruction given and allow for more individualised supervision.

The quality and satisfactory performance of learning should be the only yardstick or criterion used by the teacher, to the exclusion of the time constant ("the duration of the curriculum is six academic years"). What should vary is the number of different types of task that any given kind of health professional can perform. Every member of the health team, and the physician most of all, is a potent therapeutic agent but a poorly tested one. The least toxic medication listed in the International Pharmacopoeia has undergone more thorough double-blind testing than any health professional anywhere, at any time. Cigarettes are sold with a printed health warning. Does not the university have a social duty to protect all citizens from the potential danger that physicians and the other members of the health team may represent?

14. To set an example

Finally, the teacher should serve as a model of professional conscientiousness, reliability, analytical sense and efficiency. We have all met such men in the course of our studies. We have also met the other kind. We tried to imitate the former and sometimes despised the latter. In connexion with students' values and personality, the following quotation from the American Association of Medical Colleges Longitudinal Study, reported by E. B. Hutchins (1964), should be remembered. Describing the effects on students of their years of study, Hutchins says ". . . the interest in ***understanding how others feel*** about problems or the need to place one's self in another's shoes .. . . has, on the average, ***decreased***". To a potential patient, this statement is very disturbing. If it reflects a widespread reality, the cause could lie in the example that has been set.

Conclusions

Nostalgic remarks are often heard about the good old days before professional educators had begun to invade the educational black box. One could then lecture and enjoy the feeling of satisfaction any good teacher has the right to expect. Nowadays, teaching is somewhat more complex, especially if the idea is accepted that it should be for the benefit of the learner and not only for the satisfaction of the teacher. Some teachers have already undertaken some of the functions described in this paper. They may feel satisfied even if they fulfil only a few, as the present educational environment is of no great help to their efforts in that direction. The conclusion must be that, despite all that has been achieved in the field of teacher training, much still remains to be done. Some have more gift for teaching than others, but all have the possibility of improving their performance by training as educators, even though such courses are still too seldom sought after and too seldom available.

How many teachers are really prepared to have students reach conclusions different from their own, giving first consideration to the logic of reasoning rather than the ability to arrive at a predetermined solution?

The student body represents the largest untapped educational resource in most schools.

G. Miller (1977)

EXERCISE

Read, or reread, carefully the description of the teacher's function, (pp. 3.33 – 3.37) and circle the numbers of those that you believe yourself able to perform in your present situation taking into account the university regulations and any other local constraints. For each function, describe the precise activities that *you personally* will be able to start or continue during the 12 months to come.

Function No.	Description of precise activities for each function

EXERCISE

(Continued from p. 3.39)

Function No.	Description of precise activities for each function

teaching techniques

The Handbook does not give detailed descriptions of the different teaching techniques employed in centres for training health personnel. This is intentional, for an abundant literature is available on these subjects to which the reader is referred (see references). Another reason is that the main purpose has been to stress the relevant aim of the teaching (whence the almost obsessional insistence on the need to define educational objectives) (chapter 1) and on the means for checking if and how these aims have been achieved (chapters 2 and 4). The problem is not merely one of ***communicating*** better (this is the subject of chapter 3) but of better communicating a ***relevant message***.

For details concerning teaching techniques, lectures, seminars, tutorials, practicals, programmed learning, etc., the reader should refer to the specialised publications (see references, page 7.01). The following are also suggested as useful reference documents:

The lecture method of instruction – Eileen Bughman, Public Health Papers No. 52, WHO, pp. 57–63

Audiovisual aids to learning – E. B. Penta and T. V. Telder, Public Health Papers No. 52, WHO, pp. 40–51

The selection of teaching/learning materials in health sciences education. WHO Technical Report Series No. 538

Audiovisual media in medical teaching – M. A. C. Dowling, Public Health Papers No. 47, WHO, pp. 53–78

Group techniques in education, UNESCO, Educational Studies and Documents Series, No. 24, Paris 1977

As a teaching technique workshops are certainly very useful and efficient. For details see chapter 5.

The teacher's role is to encourage the desire to learn rather than the desire to know.

advantages and disadvantages of certain teaching methods and of different educational media

Advantages	Disadvantages
1. Lectures	
1. Apparent saving of time (for the teacher) and resources. 2. Presence of the teacher (showmanship). 3. Covers a large group of students. 4. Gives a feeling of security.	1. Keeps the student in a passive situation. 2. Does not facilitate learning how to solve problems. 3. Offers hardly any possibility of checking learning progress. 4. Does not allow for individual pace of learning. 5. Low receptivity.
2. Small group activities	
1. Permits a teacher/student dialogue (thanks to the availability of the teacher). 2. Facilitates evaluation.	1. High costs in personnel and time (unless peer-teaching is used).
3. Practical work 4. Bedside teaching 5. Field work	
1. Puts the student in an *active* situation. 2. Covers a limited group of students. 3. Permits evaluation of degree to which educational objectives (practical and communication skills) have been attained. 4. Develops qualities of observation and decision-taking. 5. Ensures closer contact with reality (professional, health situation of country, colleagues and teachers). 6. Permits comparison between practice and theory. 7. Enables student to develop self-confidence. 8. Increases variability.	1. High personnel, transport and material costs. 2. Sometimes puts the patient in a difficult situation. 3. Poor standardisation. 4. Narrow limits of utilisation, therefore requiring careful planning.

Advantages	Disadvantages
6. Books, handouts, programmed learning from books, and simulation (self learning packages).	
1. Enables student to work at his own pace. 2. Facilitates self-evaluation. 3. Makes mass teaching possible with high efficiency. 4. High availability. 5. Facilitates decision-taking (solution of complex problems). 6. Reduces risks (for patient or society). 7. Avoids bias transmitted by "bad teachers". 8. Allows a good teacher to save time that can then be spent on more complex activities such as interpersonal relations. 9. Can be kept up to date with new scientific developments and contain references to other documents.	1. Necessitates special educational competence. 2. High additional *investment* costs (in teachers' time and money). 3. No group dynamics.
7. Real objects and specimens	
1. Present reality, not substitutes. 2. Three dimensional. 3. Permit use of all senses in study.	1. May not be easily obtainable. 2. Inconvenience of size – danger in use. 3. Costly or not expendable. 4. Usually only usable in small groups. 5. Sometimes easily damaged. 6. Problems in storage.
8. Models and simulation devices	
1. Three dimensional and concept of reality. 2. Size allows close examination. 3. Good for magnified situation. (e.g. middle ear mechanism). 4. Can be used to demonstrate function as well as construction. 5. Can permit learning and practice of different technique. 6. Some can be made with local material.	1. Craftsmanship required for local construction. 2. Simulation models often expensive. 3. Usable for small groups. 4. Models often easily damaged. 5. Never *same* as performing technique on a patient. Beware of faulty learning.

Advantages	Disadvantages
9. Graphics (charts, diagrams, schematic drawings), posters, paintings, photographic prints	
1. Promote correlation of information. 2. Assist organisation of material. 3. Photographs nearer to reality than drawings, but association often valuable. 4. Usually easily produced and duplicated (black and white photos). 5. Easy to store, catalogue and retrieve.	1. For small audiences only (unless projected with epidiascope). 2. For effective use, good duplicating equipment and trained staff needed.
10. Blackboard or flipchart	
1. Inexpensive, can be made locally. 2. Usable for wide range of graphic representation. 3. Allows step-by-step build up, or organisation of structure or concept.	1. Back to audience. 2. Audience limited to 50 or so. 3. Careful drawings erased, not preserved for future use, except in the case of flipcharts. 4. Considerable skill required for effective use (rarely taught to teachers).
11. Flannelboard (flannelgraph). (Most of the comments apply also to magnetic board).	
1. May be used repeatedly. 2. Usually preparable from locally available materials. 3. Good for showing changing relationships. 4. Holds attention if well used. 5. Can be adapted for group participation.	1. For limited audience only. 2. Difficult technique to use convincingly.
Projectable Media	
12. Still pictures – Opaque projection (epidiascope)	
1. Enlargement of drawn or printed materials for large audiences. 2. Obviate need for producing slides and transparencies. 3. Enlarged image may be transferred to chart or blackboard for copying. 4. Small objects and specimens may be projected.	1. Demands total darkness for clear projection (except with very expensive models). 2. Bulky machine, difficult to transport. 3. Electricity required.

Advantages	Disadvantages
13. Transparencies for overhead projection	
1. Projectable in full daylight to large audiences. 2. Presented facing audience. 3. Relatively easy to prepare with local materials. 4. Subjects can be drawn in advance or developed by stages with the group. 5. Can demonstrate movements, processes, etc. with transparent or coloured perspex models.	1. Electricity required. 2. Equipment and materials for making sophisticated transparencies expensive. 3. Not usually suitable for photographic material due to cost (although adaptor available to take 35 mm slides). 4. Usually restricted to teacher use, as it is not easy to adapt for the learner to use.
14. Slides and filmstrips	
1. Suitable for large audiences. 2. Relatively easy production and (in black and white) reproduction. 3. Cheapest current forms of visual medium. 4. Easily adaptable to self-learning packages. 5. Equipment available for viewing or projection without electricity source.	1. Fixed order of frames in filmstrip restrictive in use. 2. Need partial darkness for viewing unless rear screen or daylight screen used. 3. Duplication of colour slides expensive (even impossible in many countries).
15. Microfiches	
1. Easy storage and cataloguing of large numbers of visuals. 2. Exchange of information on available collections. 3. Very cheap per image if projection can be assured for large groups. 4. Small and light for easy despatch.	1. Too small for clear naked-eye viewing. 2. Although inexpensive equipment available for individual use, large group projection equipment not readily available.
16. Films 8 mm and 16 mm	
1. Close to reality with movement and sound. 2. Suitable for large audiences (16 mm); for small groups only (8 mm). 3. Compression of time and space. 4. Emotive, can develop attitudes, pose problems, demonstrate skills.	1. Does not permit self-pacing. 2. Films costly and difficult to produce. 3. Individual films relatively expensive. 4. Electricity required. 5. Equipment difficult to transport.

Advantages	Disadvantages
16. Films (8 mm and 16 mm) continued.	
5. 8 mm loops useful for individual instruction. 6. Good learning source if preceded by teacher's introduction and followed by discussion.	6. Darkness needed for viewing (except rear screen use). 7. Imported film may contain inappropriate information (see item in advantage 6).
17. Open circuit television	
1. Adaptable to large and small audiences in widely distributed area. 2. Capable of gaining and maintaining attention. 3. Can stimulate emotions, build attitudes and develop problems. 4. Can conserve resources of instructors by simultaneous broadcast to many classes.	1. Programme expensive to produce and demands highly skilled staff. 2. Receiving equipment expensive and difficult to maintain. 3. Electricity required. 4. No immediate interaction or feedback. 5. Learner must adapt to a set programme with no possibility of repeats.
18. Closed circuit television and videotapes (including videocassettes)	
1. Adaptable to medium and small audiences. 2. Videotape repeatable to fit learning schedules. 3. Film advantages 1, 3 and 4 apply (see above). 4. Valuable for magnification of image, recording intimate situations, micro-teaching, recording of developments in clinical syndromes or in scientific experiments, "bringing the village into the classroom", recording emergencies, etc. 5. Portable equipment can function on battery for field recording.	1. High initial cost of production equipment, and requirement of trained staff. 2. Electricity required. Although portable equipment works off battery, this needs charging from power source. 3. Receivers are expensive and require maintenance.
Sound Media	
19. Radio broadcasts	
1. Adaptable to large and small audiences in widely separated areas. 2. Conserves resources of instructors by broadcasting simultaneously to many classes.	1. Special studio facilities and staff required for broadcast (less expensive and complex than television). 2. Learners must adapt to fixed schedule, not other way round.

Advantages	Disadvantages
19. Radio broadcast (continued)	
3. Capable of gaining and maintaining attention. 4. Reception equipment relatively cheap and will function on batteries. 5. If combined with prepared materials (radiovision) can be improved learning tool.	3. No immediate feedback and no audience interaction.
20. Sound recordings	
1. Adaptable to any size of audience. 2. Especially suited to individual and small group learning. 3. Because of stop and playback facilities of tape, can be student paced. 4. Cheap, battery operated cassette players available, and cassettes relatively cheap. 5. Many uses – to provide sound for slide sequences, for micro-teaching, heart sounds, for posing problems, etc.	1. Use for individual learning demands many playback units. 2. *Good* quality recording demands studio facilities.

Note concerning the preparation of "transparencies"

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Certain pages of the Handbook are printed in large type and can be used as *matrices* if you should wish to make your own transparencies for projection using an overhead projector.

There are different methods, depending on the photocopying equipment available.

In general, all you need do is to place a sheet of transparent, thermosensitive acetate film on top of the Handbook matrix[1] and put the whole in the photocopying machine. In a few seconds you will have a transparency ready to be projected on your overhead projector.

Please follow the instructions applying to the particular photocopying machine available to you.

[1] You can obtain them by removing the binding from the Handbook and placing the sheets in a ring-file.

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self-learning packages

If you agree that one of your functions as a teacher is to prepare learning aids for your students and to help them obtain the information they need for independent learning, then read the following pages which explain what self-learning packages are and give an example of this learning technique.

We have seen that a professional task derived from an intermediate objective may serve one or more specific objectives, either final or enabling. The task must be broken down to the level of the specific objective, which must have two characteristics: it calls for a single activity; and it can be satisfactorily evaluated by applying a single criterion measuring a given domain.

Such a specific objective, or task, constitutes the basis for constructing "packages" designed to facilitate self-learning.

Each self-learning package will comprise:

1. The statement of the specific objective.

2. The full documentation needed to achieve the objective. This may include references to any of the following: existing papers, tape recordings, slide sequences, places, persons, and so forth.

3. A formative evaluation instrument to enable the student to assess the extent of his success in reaching the objective.

In some cases, several closely linked specific objectives are related to the same learning activity. It is then advisable to avoid too detailed a breakdown, and to combine the different "packages" for such a learning activity into one "super-package".

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A self-learning package is a document containing all that is necessary for a student to attain one or more educational objectives independently of the teacher. Using these packages, the student can take over a large part of his training, while the teacher remains available only when needed.

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The technique of self-learning packages is similar to that of the Keller plan (see Bibliography), but the latter also includes the coordination and supervision of the student's activity by monitors, and group work sessions to stimulate students' motivation.

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A simple example of a self-learning package is given in the following pages. More complex examples would also include: slides and transparencies, X-ray photographs, loop films, laboratory and field work, and so forth.

self-learning package

WHO-sponsored Training Course in Epidemiology

Main topic: Sampling

Sub-topic: Sampling techniques

(Prepared by Mr. T. K. Sundaresan)

Relations to the functions of the epidemiologist.

Sample surveys are an efficient and economical means for obtaining information on matters of epidemiological importance, e.g. prevalence of specific diseases. There are several sampling techniques available to suit different practical situations and specific objectives of the investigation. For a given situation one technique can be more efficient and economical than another. A knowledge of these techniques, their advantages and disadvantages all greatly help in choosing the most appropriate technique for that situation.

Educational objective (Ref. No. 5.6)*

After studying this document and doing the exercises listed at the end you should be able to suggest the appropriate sampling technique for most epidemiological investigations.

Pre-requisites to understanding this section

1. Understanding the concept of random sampling (Educ. Obj. No. 5.2)*
2. Understanding the terms "precision" and "accuracy" (Educ. Obj. No. 5.3)*
3. Understanding the concept of "confidence intervals" (Educ. Obj. No. 5.4)*

1. Preamble

The epidemiologist, wishing to carry out a sampling investigation, has often to choose one of several techniques of sampling. Some of the considerations that play a role in the choice of the most appropriate technique are: availability of a suitable frame, facility of the field operations, acceptable precision of the estimates, the sub-categories of the population for which separate estimates are required, etc. There are many techniques available but in this package only the following will be considered:

1. Simple random sampling
2. Stratified sampling
3. Two-stage sampling, *and*
4. Cluster sampling

Simple random sampling

Definition: A sample of size n, drawn from a population of size N in such a way that every possible sample of size n has the same chance of being selected, is called a ***simple random sample***.

Example: It is desired to determine the prevalence of a certain infectious disease among the 1000 people in a village (N = 1000). The desired accuracy of the estimate dictates that 100 people from the village must be examined for the disease (n = 100). A list of all inhabitants is obtained (the population frame). Then, using a table of random numbers, a sample of 100 persons is selected in such a way that each person in the village (i.e., each entry in the list) has a 10% (n/N) chance of being selected for the examination.

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*Note: These references are to a document distributed to participants at the WHO Training Course.

Advantages:

1. Simple design.

2. Requires no knowledge of the distribution of the study variable in the population.

Disadvantages:

1. Requires a population frame which can be expensive or simply not available.

2. Travel expenses could be high if the population is spread over a large area.

Stratified random sampling

Definition: ***A stratified random sample*** is one obtained by first separating the population into non-overlapping groups, called ***strata***, and then selecting a simple random sample from each stratum.

Example: Continuing with the example given above for simple random sampling, before selecting the random sample of 100 the entire population is divided into age-groups (stratified on age). Then a simple random sample is taken from within each age-group (stratum). The total number of examinations is still 100, but now the prevalence is available ***by age-group*** and the precision of the ***overall*** prevalence estimate is improved. This improved precision is due to the fact that sampling is now done within more homogeneous groups (under the assumption that prevalence is correlated with age).

Advantages:

1. Estimates are available for each stratum of the population and not just one overall estimate, as in simple random sampling.

2. Some gain in the precision of the overall population estimate, with an appropriate method of stratification.

Disadvantages:

1. A population frame is required.

2. Certain preliminary information is required on the variable(s) to be used for stratification. This may be expensive or simply not available.

3. While stratifications on certain variables may improve the precision of the estimate of one parameter (prevalence of a disease, in the above example) it may give rather poor estimates for other characteristics to be studied at the same time (e.g. fertility).

Cluster sampling

Definition: ***A cluster sample*** is a simple random sample in which each sampling unit is a collection, or cluster of elements.

Example: Continuing with the above example; if a population frame is not available, then the sampling may be done as follows: a list of dwelling units is drawn up; this is much easier than a complete list of individuals. A simple random sample of dwelling units is selected and all individuals in each selected unit are examined.

Advantages:

1. Reduction in travel costs

2. Complete population frame not necessary

Disadvantages:

1. The variability within and between clusters must be considered. If the variability within a cluster is low, this could lead to unnecessary within-cluster precision, using the same number of examinations, while insufficient precision is obtained for the overall estimate.

Two-stage or sub-sampling

Definition: A two-stage sample is obtained by first selecting a sample of groups and then selecting a (sub) sample of elements from within each of the sampled groups.

Example: Continuing with the previous example; the investigators decide to use the list of dwelling units, as the population frame is not available, but wish to cover more dwelling units with the same number of examinations. A simple random sample of dwelling units is selected, then, as the second stage, a simple random sample of the individuals within each of the selected dwelling units is chosen.

Advantages:

1. Wider coverage. If it is believed that individuals within the same dwelling unit are similar with respect to the quantity measured, then it makes little sense to measure the same thing so many times.

2. Does not require a complete population frame.

3. Reduction of travel costs.

Disadvantages:

1. It sometimes can cause difficulties to include in the sample only a portion of a household or group.

2. Incomplete information concerning the distribution of the quantities measured at the various stages can lead to poor results.

self-testing exercises

(a) A survey is planned to determine fertility rates in a large geographical area for which no accurate lists of individuals exist; however the villages and towns are well documented.

1. Suggest two possible sampling schemes.

2. State two advantages that each has over the other.

(b) It is desired to know the morbidity rate among the population of a city. The results of a recent census, including age and sex, are available.

1. Suggest two possible sampling schemes.

2. State two advantages that each has over the other.

(c) It is desired to estimate the prevalence of tuberculosis in a country. The population census is at least 10 years old and it is known that movements of population may have taken place. It is also suspected that the prevalence in urban areas is likely to be different from that in rural areas. Make any assumptions, relevant to your country context, on operational factors and suggest a sampling scheme.

answers

(a) 1. Cluster and two stage

2. **Cluster over two stage:**

○ reduced travel cost (must visit fewer villages)

○ simplified design

○ requires less knowledge of the distribution of the variables measured

Two stage over cluster:

○ wider coverage (provides estimates for more towns and villages)

○ more flexible, one can alter sampling fractions to attain increased economy if there is some preliminary knowledge about the variability among villages

(b) 1. Simple random and stratified random

2. **Simple over stratified:**

○ simplified design

○ no prior knowledge of the distribution is necesssary

Stratified over simple:

○ estimates by age and/or sex may be obtained

○ more precise overall estimates may be obtained

(c) Suppose is it most efficient operationally

1. to examine all members of the household once a household is selected, ***and***

2. to station the mobile X-ray van and the team in one area for at least one week
3. and suppose that 50 individuals can be examined in one day, and further that
4. at least 20,000 individuals have to be examined to yield an estimate with acceptable precision.

The following can be recommended as one possible procedure.

Because of the operational factors outlined it would be best to adopt a multi-stage cluster sampling, stratified into rural and urban areas. Suppose it is decided to examine 10,000 individuals in the rural and 10,000 in the urban areas. Taking as an example the rural areas: the 10,000 individuals could be considered as the population of 40 clusters consisting of 250 individuals in each cluster (50 individuals per day) for five days a week. If the average household size is 5 this would mean 50 households in each cluster.

Based on the old census, the country can be divided into its major administrative divisions, and the 40 clusters allocated to these divisions, in proportion to their population.Within each major administrative division, minor divisions where the cluster should be located may be selected at random at the second stage. Further stages may be introduced if the divisions are large.

Once the last stage, say a sub-division with a population of around 1000 is reached, a complete census of this sub-division is made and a household selected at random. Fifty consecutive households in a predetermined order will give the required cluster.

criteria for priorities in selecting packages

1. They should deal with an educational problem of major importance for the majority of students.

2. They should be directed to the solution of a health problem of major importance for the people.

3. They should make good a deficiency in the existing teaching system or in existing educational tools.

4. They should not needlessly be superimposed on another package dealing with the same problem.

5. They should allow for the possibility of prompt updating when required.

6. They should be more effective and economical than any other educational tool serving the same purpose.

Educational concepts that are useful in weighing the advantages and disadvantages of self-learning packages or other teaching methods.

1. Educational activities should be directly related to the tasks to be performed by the trainees (relevance).

2. Tasks should be explicitly defined and should correspond to community health needs.

3. Educational activities should be designed to meet students' needs, with emphasis on individual training and the possibility for each student to work at his own pace, even in mass teaching situations.

4. The educational system should provide the student with the work tools he needs for his continuing education.

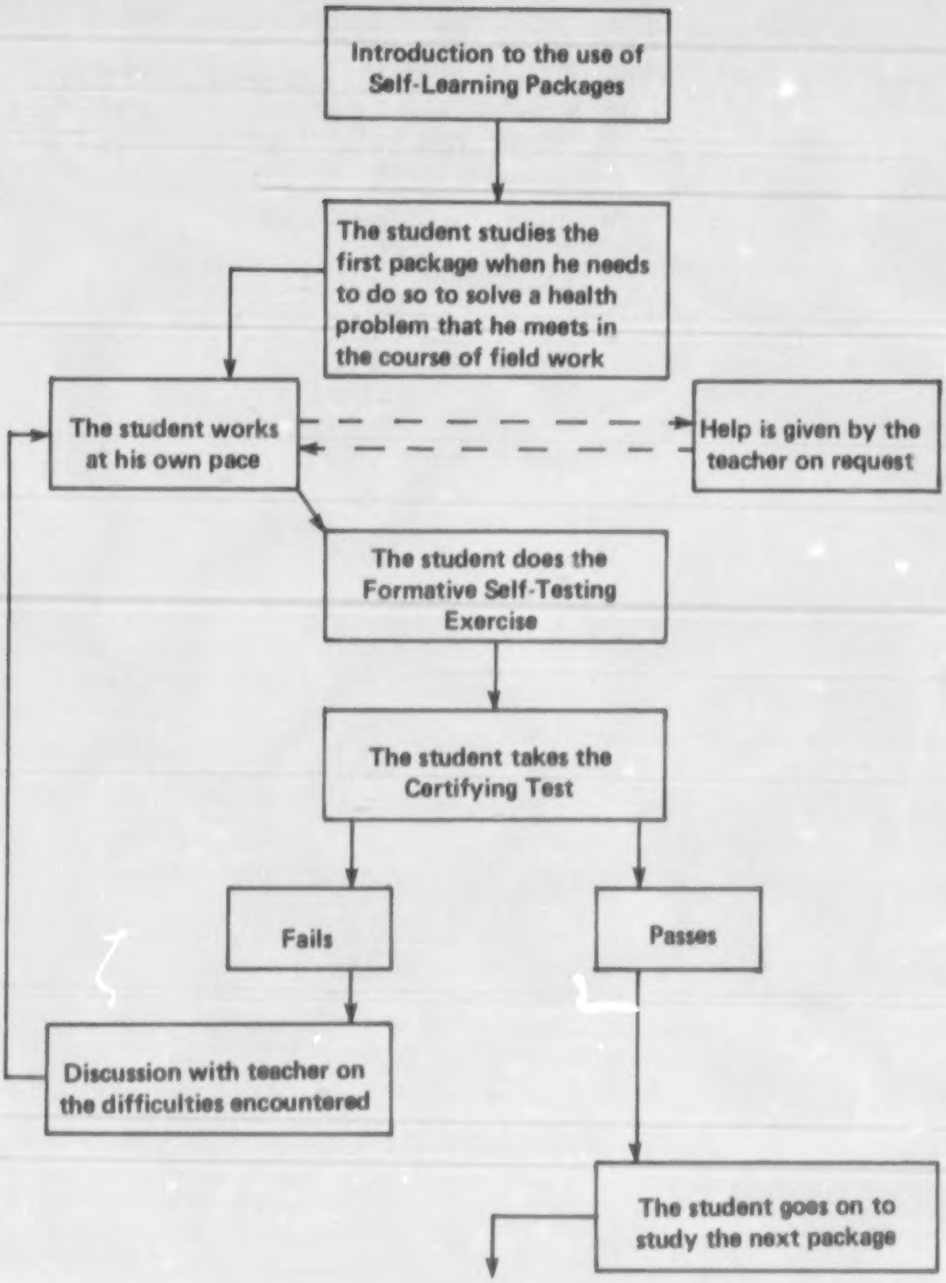
5. Educational activities should if possible take place in the same sociocultural environment as that in which the professional tasks will be performed. They should include the practice of the same skills as will be required in real problem-solving situations.

6. All training activities must be accompanied by formative evaluation.

7. Learning techniques also must undergo evaluation during use in order to ensure that they really correspond to the students' needs and are in accordance with the sociocultural environment; they must also be practicable in use for both students and teachers.

8. The overall evaluation of the programme must be incorporated in the system.

how to use the packages


Introduction to the use of Self-Learning Packages
The student studies the first package when he needs to do so to solve a health problem that he meets in the course of field work
The student works at his own pace
Help is given by the teacher on request
The student does the Formative Self-Testing Exercise
The student takes the Certifying Test
Fails
Passes
Discussion with teacher on the difficulties encountered
The student goes on to study the next package

some introductory remarks on the construction of a student-orientated programme

It has already been said that the educational spiral should be taken into account in constructing a programme (see p.3.03)

Other major considerations are:

The student should be motivated. Learning is not only an intellectual but also an emotional process. The student's motivation will be all the greater if he takes part in preparing *his own* learning programme. This is a fundamental consideration, and will be dealt with later (p. 3.63).

The student should be able to see the links between his different learning activities. However, the health professions have become more and more complex and teaching institutions have had to use an ever greater number of teachers in a growing variety of subjects. The result has been a ***disintegration*** of programmes. It is therefore important to ensure that the programme is not itself constructed in such a way as to be a source of disintegration. The student should be enabled to participate in a large number of learning activities, either simulated or real, which should constitute true exercises in integration.

The student should be able to connect practice with theory. In most teaching institutions, this connexion is rarely close. Very often, the emphasis on theory in examinations has an unbalancing effect. The learning programme should be oriented to the real life situations that will be met in the course of future professional activity. As he tackles each health problem the student should become gradually more proficient in analysing a situation, gathering the necessary data, perceiving the relevant theoretical bases, perhaps through the use of self-learning packages, and profiting from a self-evaluation test that keeps him informed of his progress.

If the above elements are kept in mind, the learning programme will leave room for individual training and enable the student to develop a method of work that will serve for his effective continuing education.

The role of the teacher is of prime importance for the proper implementation of such a programme. It was described on pp. 3.33 - 3.37.

□ □

The essential point in constructing a student-oriented programme is to organise the rotation of students from different years in the different places of learning activity (professional fields) in small groups under the responsibility of teacher-coordinators; in that way students are progressively confronted with health problems according to their level of abilities. They have at their disposal a variety of self-learning packages and other sources of information and experience such as workrooms, library and laboratories, while their efforts are guided and their progress is measured by a system of formative evaluation based on pertinent educational objectives.

□ □

The scheme outlined above is oriented to students' learning needs, and is a far cry from a teaching programme conditioned by the competency and availability of the teachers.

After doing some of the exercises in selecting teaching methods (pp.3.57 and 3.58), you could refresh your memory on integrated teaching (pp. 3.59 and 3.60) and also on integrated learning (p. 3.61), before going on to consider how to plan programme reforms (pp. 3.66 – 3.74) with all that implies in the way of constraints and obstacles to innovation and change.

Personal Notes

EXERCISE

Do the following exercise if you wish to gain practice in selecting appropriate teaching methods and/or educational media to help students attain a given educational objective.

Look at the specific educational objectives on page 1.52, or take any other specific objective you may prefer, and select the appropriate method(s) or media (indicating the number, from 1 to 20, for each given on pp. 3.42 – 3.47), and describe the constraints likely to be encountered in your institution.

Objective No.	Method or media	Constraints to be overcome
1	handouts (6) work in small groups (2)	requires the duplicating of patients' histories, with no budget provision up to now for paper or machine; peer-teaching is not customary and will need a trial period.
2	field work (5) work in small groups (2)	requires long preparation including the prior selection of families to be visited in collaboration with a social worker.
3		
4		
5		
6		
7		
8		
9		

Check whether your choice is consistent with the educational concepts on p. 3.53.

EXERCISE

Look at the educational objectives on page 1.52, or take any other specific objective you may prefer, and describe two teaching methods that will enable a class of 200 students of the same year to attain the objectives. Compare the two methods using the criteria appearing in the following *specification table.*

Objective	Establish the differential diagnosis of a case of anaemia on the basis of the haematological data in the patient's records.	Relevance	Efficiency	Practicability
I	Lecture on the differential diagnosis of anaemias – 1 hour	•••	•	•••
II	Handout giving book references on anaemias, patient histories, and a self-testing exercise	•••	•••	••

Example of Teaching Method for a class of 200 students

Objective	The student should be able to	Relevance	Efficiency	Practicability
I				
II				

Check the meaning of the words: Relevance, Efficiency and Practicability in the Glossary, page 6.01.

the concept of integrated teaching

1. Definition

Integration (from the Latin integer = whole) means coordination of different activities to ensure harmonious functioning.

This definition suggests that the result of harmonious functioning will be greater efficiency. In our materialistic world efficiency is a dogma. In the developing countries it is the key to survival. Neither the idea nor the word is new. At present both are fashionable and, as is often the case in such situations, infatuation and passion are more in evidence than logical analysis and objective appraisal. Such things are used, abused, transformed and deformed.

The password is "integration". What is integration?

We are concerned here with the meaning of integration in the field of professional education and training. To paraphrase the definition given above, integration in this field is "the coordination of different teaching activities to ensure the harmonious functioning of the educational process for more effective staff training."

2. The purpose of integration

Before the era of the mega-universities with thousands of students and before the era of specialisations stemming from a technology ramifying in all directions, the health professions were learned in the presence of the patient and in direct contact with the professor – a natural source of integration. During training, there were of course several professors and the student – second natural source of integration – assimilated, analysed and synthesised the information.

Since the beginning of the twentieth century, the university-factory, the numbered and card-indexed student, and the super-specialist have made their appearance. Fundamental and staggering scientific discoveries are being made faster than textbooks are revised and reissued. Research laboratories are draining away and absorbing funds intended for training centres. Teachers engage in research since their future depends on the results they obtain in their field. Without organised teacher-training, they are entrusted with students who are not supposed to appraise their performance. Reputation depends on the number of publications rather than the quality of the health personnel trained. Theoretically, the health worker, once trained, is a complete and integrated element. In practice, he is the outcome of a non-integrated training lacking in human feeling.

Human feeling, the concept which should inspire students and teachers, implies concern for improving the health of the people and should be the basis of the educational objectives of the university centres for health sciences. These objectives, shared by teachers and students alike, will be more easily attained if the various teaching activities function harmoniously; hence the concept of integrated teaching.

3. The advantages of integrated teaching and its limitations

The advantages attributed to integrated teaching are many and attractive. They include the synthesised presentation of important health problems, the avoidance of contradictions and pointless repetition, the respect for a logical order and the pruning of non-essential details, the improvement of the quality of teaching and teachers through emulation and of the relations between departments, and a better utilisation of teachers.

Yet some faculties that have tried it have given it up. A much larger number claim to use it but, in fact, do not do so or do so only partially.

Why is it then, that in spite of so many advantages, this method has met with more failures than successes after a very large number of trials over the last 30 years?

We do not pretend to give a reasoned answer to this question, or statistical data for or against the method. The facts can be found in the literature dealing with this question.

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We are deeply convinced, however, that the concept of integrated *teaching* suffers from a basic defect: as its name indicates, *it is teacher oriented.*

All educational theories have emphasised the efficiency of ***student-oriented methods.***

If you turn back to the principles stated on pages 3.18 – 3.37, you will see that very few of them have been really put into practice in the various trials of integrated teaching. ***Integrated*** teaching certainly has advantages over any type of non-coordinated teaching of separate subjects, but it remains a form of traditional teaching in which the teacher is predominant, and is less conducive to efficient learning than educational activities designed to help the student and lead him to achieve the necessary integration by his own efforts.

A programme composed of such educational activities, oriented to the student and not to the teacher, is suggested for your attention in the following pages.

It is the *concept of integrated learning.*

the concept of integrated learning:

a learner-orientated programme with built-in relevance and based on the acquistion of skills.

In teaching the health sciences, educators have, up to the present, more often failed than succeeded in incorporating that essential quality of any programme – its relevance. The relevance of a programme is the extent to which it facilitates the acquisiton by the student of all *the skills necessary for the practice of his profession*, whose purpose is to raise community levels of health.

In chapter 1, the basic elements necessary for formulating relevant educational objectives were indicated. It was then stressed that the *health needs* of populations, taking into account their available *resources*, should serve as a basis for such formulation. A further point made was that health planners should define the types of *health service* organisation most suitable for solving the health problems of a given population, as it is within the framework of these services that the individual members of the health team will play their *roles*, fulfil their *functions* and accomplish their special *tasks*. It was also pointed out that, in defining these roles, functions and tasks, account should be taken, as far as possible, of what would be expected of members of the health team in their future work.

Consequently *prospective definitions* are required: such forecasts being dependent on the complexity of the skills to be acquired and the consequent duration of the training programme. For those professions requiring high levels of competence (physicians, sanitary engineers, etc.) it has not been possible to define the tasks they will have to carry out in 10 years' time, other than in the form of assumptions which have variable degrees of reliability. Perhaps the developments in the science of futurology will ultimately make it possible to find solutions for this problem.

Until this is possible, however, other solutions should be envisaged.

A few years ago Laurence Weed suggested a new programme of medical education[1] which attempts to resolve the notorious and difficult problem of relevance. The originality of Weed's proposal is that it seems to solve this problem while remaining within the strict framework of training (refer once more to the diagram on page 1.08). Its main point is that the student should acquire a method of working and thinking that allows him to adapt to a rapidly changing situation while at the same time acquiring the skills he needs to practise his chosen profession.

A type of educational programme, inspired largely by that of Weed, is proposed in the following pages. Additionally it comprises an orientation closely linked to community rather than individual health problems, and it allows the student himself to make a free and enlightened choice of the role he wishes to play in society.

The programme is based on a certain number of Weed's premises which must be stated first of all, since any disagreement with these premises would probably lead to a rejection of the proposed programme. On the other hand, the mere fact of agreement with the premises would not, for most teachers, be a sufficient reason for accepting the new programme, and certainly not for using it to replace a traditional programme. This new approach is, to say the least, revolutionary; it requires replacing a whole programme and not merely changing parts of it.

The catch is that, at first sight, the premises seem relatively harmless and so inoffensive that the most traditional educator is ready not only to agree with them but even to claim that they are nothing new and that he himself adopted them long ago (if, indeed, he did not think of them himself).

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[1] Described in his book: Medical records, medical education and patient care. Cleveland, The Press of Case Western Reserve University, 1970.

Weed's premises

1. **General educational objectives**

A health professional should be able:

1.1 to set his personal ***goals related to his work*** within the organised system of health services, and to develop his own approaches to the achievement of these goals; he must also seek criticism from teachers and fellow students.

1.2 to define health ***problems*** and to collect relevant data and utilise them for solving the problems.

1.3 to ***audit*** his own performance or that of a colleague using carefully established criteria.

1.4 to demonstrate the ***qualities*** of professional thoroughness, reliability, sense of analysis and efficiency.

2. **Teaching and learning techniques**

The programme must make it possible for the student:

2.1 to acquire basic ***skills,*** and not merely basic knowledge; practical and communication skills and not only intellectual ones; the preponderant role of recall must be reconsidered, the lasting ability to recall must be based on repeated use.

2.2 to learn and think ***independently*** and to learn from his experience. Every patient will be a source of data, while the teachers should ensure intellectual discipline and encourage value judgements.

2.3 to acquire ***independently,*** by the study of documents and information prepared for the purpose (books, scientific journals, duplicated texts, audiovisual aids, etc.), everything that is usually transmitted by traditional lecture-courses, provided that the educational objectives are known to him and that he performs formative evaluation exercises constructed on the basis of the objectives.

2.4 to acquire his professional skills through ***the practice of real professional acts*** of increasing difficulty, compatible with his level of achievement.

2.5 to practise professional acts under a control and supervision that leads him to ***understand the underlying basic principles.***

2.6 to find solutions to a diversity of new problems, thus developing his ability to carry on by himself once the problem to be solved has been defined.

3. **In the organisation of studies the following points should be considered:**

3.1 The quality of achievement and acceptable performance for a given task should be regarded as a constant. ***What can vary is the number of types of tasks*** that a given health professional should be able to accomplish.

3.2 The length of study programmes should ***not*** be regarded as a constant. It is preferable to have a clear definition of the skills to be acquired, and for ***the time necessary*** to master them to ***vary*** for different students, depending on their ability and drive and on the availability of teachers and educational facilities.

3.3 There is no natural frontier in the practice of health care between the physical sciences and the humanities, nor between science and culture in the broadest sense of the word. Students should be enabled to define the patient's social and psychological problems in addition to his "medical" ones, and to look for a logical solution, either by themselves or with the aid of specialists, for each of such problems. Simply to organise courses in the social and behavioural sciences does not automatically ensure that future physicians will be able to relate their daily practice to the culture to which they belong.

3.4 The main educative role of the basic scientist is not to train health personnel in his special subject but to audit their performance to ensure the correct application, or to detect any violation, of the basic scientific principles of that subject.

competency-based programme/contract an excursion into Utopia

The programme includes four phases at the end of which the student is awarded *a degree certifying he has reached a satisfactory level for certain specified skills.*

The total duration of each phase may vary for each student and is determined by the achievement of an acceptable level of performance for a given number of educational objectives which together constitute the basis of a *contract* between the student and the teaching institution. Depending on the terms of the contract, the degree may be that of doctor of medicine, nurse, medical assistant or, for example, specialist in cardiology or in stomatology.

Description of the Programme/Contract

First phase (very approximate length – one to three months). Goal: *to learn how to learn.*

1. At the end of the first phase, the student should be able to:
    - 1.1 show competence in planning education at initiation level;
        - 1.1.1 define educational objectives on the basis of tasks;
        - 1.1.2 plan a learning programme, *and*
        - 1.1.3 construct tests and other formative measuring systems;
    - 1.2 utilise the resources of the institution, such as microscopes, slides, library, computers, or members of the health team; *and*
    - 1.3 describe the concept of health team.

Second phase (approximate length 12 – 18 months). Goal: *to identify his professional role in society.*

2. At the end of the second phase, the student should be able to:
    - 2.1 prepare a list of what he considers the ten *main* health problems of the community;
    - 2.2 collect a data base on the community and interpret these data in order to:
    - 2.3 identify its priority health problems;
    - 2.4 describe the health activities (services) which would enable the community health problems to be solved, and compare these activities with those usually undertaken;
    - 2.5 *identify the professional role* which he (the student) wishes to assume at the end of his training;
    - 2.6 describe the functions, activities and tasks corresponding to that role; *and*
    - 2.7 prepare a set of educational objectives[1] (with evaluation criteria) and indicate the acceptable level of performance for each of such tasks.

At the end of the second phase, a *contract* is signed between the student and the teachers (Faculty, School or other institution). The contract provides, on the one hand, that the student undertakes to achieve the educational objectives (described under 2.7 above) within a given period (e.g. three, four or five years), and, on the other hand, that the teachers undertake to facilitate the student's work (see the teacher's functions, pp. 3.33 – 3.37). It is understood that the teaching staff has full responsibility for certifying the abilities of the student before he is authorised to practise without supervision. The contract may be revised from time to time if the results of the evaluation procedures justify that course.

Once the *contract* is signed, the student really begins to learn his profession .

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[1] It should also be borne in mind that the definition, at the most general level, of educational objectives for the higher levels of professional staff must include the following objective: "To be capable of finding solutions to problems arising from new situations". From that general objective, a whole series of more specific objectives will be derived, including the acquisition of a scientific manner of thinking, for which the teaching of the basic sciences will have a large responsibility, and of a method of work essential for the continuing updating of professional skills.

Third phase[1] (very approximate length – 1 year). Goal: *to learn basic techniques.*

3. At the end of the third phase, the student should be able to:
    - 3.1 collect the data base on the members of the community, both sick and healthy (the basic data, such as chief complaint, patient profile, systems review, physical examination, laboratory data, etc.) are clearly defined by Weed; the reader is advised to consult his works and make sure that students collect all the necessary data);
    - 3.2 audit the data base for a given patient collected by another student; *and*
    - 3.3 carry out clinical techniques (such as phlebotomy, sutures, lumbar puncture, funduscopy or auscultation) corresponding to the educational objectives described under 2.7.

Fourth phase (very approximate length – 3 years). Goal: *to acquire professional skills.*

4. At the end of the fourth phase, the student should be able to:

    carry out (together with other members of the health team) all tasks involved in the health promotion/rehabilitation of the community in which he is living, and perform the role he has chosen for himself (see above 2.5 to 2.7).

Throughout these four phases, a series of formative tests are provided to enable the student to form an idea of what remains for him to do to attain the objectives he has set himself. The degree, or authorisation to practise his profession, is awarded by the teaching institution only when the student has demonstrated, by passing the *certification* tests, that he is capable of an acceptable level of performance for the objectives of the contract.

Unfortunately, it very often happens that, when the reader reaches this point, he decides that the programme is too utopian ever to be put into practice without a cultural *revolution*. He is therefore urged to reread carefully the brief description of the various functions of the teacher given on pages 3.33 – 3.37 which are much more attainable within the limits of a certain evolution. He should then do the exercise on page 3.39. Perhaps a little day-dreaming was not such a bad idea, it can be valuable to set oneself an ideal.

Some universities and schools are already applying a good number of these principles. In WHO Public Health Papers No. 70 (1978) and No. 71 (1980) you will find descriptions of the programmes of the McMaster University, Ontario, Canada, the Maastricht University, Netherlands, the University of Newcastle, N.S.W., Australia, or the Xochimilco University, Mexico, a description of the nursing training programme at the Mahidol University, Thailand, and accounts of training programmes for other health workers at Madang, Papua New Guinea.

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[1] The third and fourth phases correspond to the programme in the form proposed by L. Weed in The New Curriculum, the problem-oriented system, Medcom 1972, pp. 95 – 104.

briefly then, this programme

- is oriented to the needs of society
- ensures the continuous supervision of the student and protects society against incompetent health personnel
- provides a basis for continuing training
- concentrates on the interests of the student and encourages individual learning
- allows each student to work at his own level and at his own pace
- keeps students in an active situation and gives a leading role to experience
- leads the student to discover and understand the "why" and "wherefore" of his learning experience
- accepts the idea that it is all right to be different
- increases the student's sense of responsibility and his control over his own learning
- encourages students to collect, analyse, evaluate and interpret data
- emphasises the importance of cooperative self-evaluation
- confronts students with real-life situations
- introduces students to team work
- allows students to practise what they have learnt
- enables students to acquire their professional skills under conditions similar to those in which they will later practise

planning the changes required to bring about programme reform[*]

A key component of educational reform and innovation is the ***organisational modification*** needed to plan and implement the desired changes. In other words, how will the organisation be modified to facilitate change? Who is to do what and in what sequence? Is the completion of some tasks prerequisite to beginning others? What supporting actions need to be taken and what resources need to be made available in order for the change to take place in an orderly and effective fashion?

In order to illustrate some of the ***planning principles*** which need attention, the attached planning schedule has been prepared as an example.

Why a planning schedule

It is designed to help to answer the following questions:

- If a curriculum is designed on the basis of ***professional skills to be acquired*** rather than ***time to be used***, how should this affect the planning process?
- How can a faculty be organised with a view to introducing a "new" programme?

Planning schedule concepts

The concepts both explicit and implied in this plan represent a radical departure from traditional practice in schools of health sciences. If a school is to shift to the type of system described here, the transition must be regarded as a ***long-term (perhaps four or five years) project***. This suggests that:

- A plan for phasing from the old system to the new one should be developed.
- A series of intermediate objectives should be set with time deadlines.
- The objectives should indicate which parts of the old system should be improved, which elements of the new system should be introduced, and in what sequence.
- The plan should be discussed with the teachers and appropriately revised before becoming institutional policy.

Sequence of steps (see pages 3.67 – 3.70).

The system proposed is hypothetical and should be used only as a means for beginning work on a system appropriate for any given school.

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[*] Adapted from a document by Dr. J. Hess, Wayne State University School of Medicine, Detroit, Michigan, USA, (1971)

A representative sequence of steps for planning and implementing a "new" programme

Action	Taken by	Obtain agreement from
1. Set up a working group (Programme Committee) with authority and responsibility to plan and co-ordinate a new programme. Members should be selected for creative abilities as well as for distribution among disciplines. In addition, students, practitioners and health administrators (central level) should be included.	Faculty Council	University administration; major power centres in the Faculty or School.
2. Prepare a written statement of overall objectives in terms of the functions that graduates should be able to perform, and a statement of the general philosophy of the programme.	Programme Committee	
3. Obtain approval of the written overall objectives and the programme philosophy. Revise as needed to obtain agreement with the plan in principle.	Approval to be given jointly by the Faculty Council and the Programme Committee	University authorities; major power centres in the School; Ministry of Health
4. Select the organising principles that will be used for planning the new programme. Examples are: – competency base; – body systems in health and disease; – clinical problems base; – the processes of clinical medicine; – a preventive medicine model; etc. – community problem base; – programme with contract.	Programme Committee	

Action	Taken by	Obtain agreement from
5. Lay out a general sequence of programme phases in block diagrams or outline form based on: 5.1 Organising principles and philosophy of the programme 5.2 Assumptions and data concerning capabilities of incoming students; 5.3 Terminal programme objectives; 5.4 Available teaching resources.	Programme Committee	Faculty Council
6. Select the disciplines that should have major representation in each programme phase.	Programme Committee	
7. Organise committees of teachers for the main programme phases. Critical factors: 7.1 Those responsible for each phase should: (a) be able to advance convincing arguments in support of the programme philosophy, and (b) have demonstrated ability to get things done in committee. 7.2 Most committee members must be open-minded and ready to break with tradition. 7.3 Major disciplines mentioned in step 6 must be represented.	Programme Committee	Faculty Council Heads of Departments
8. Select teachers[1] to lead student groups.	Committee of Teachers	Heads of Departments

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[1] The term "teacher" should be understood in its new sense, which includes senior students.

Action	Taken by	Obtain agreement from
9. Begin training sessions for committee members and the teacher-leaders of student groups. General subjects: 9.1 Educational philosophy and objectives; 9.2 Teaching concepts and methodology; and 9.3 Fundamental principles essential for the success of the teaching programme.	Programme Committee with assistance from education consultants from: (a) the University itself; and (b) other organisations.	
10. The requisite level (for students) and the intermediate educational objectives for each phase are prepared or reviewed by the Committee of Teachers. Preferred sequence: Begin with last phase prior to graduation and work back to entry point of programme.	Committee of Teachers following guidelines from the Programme Committee and education specialists.	
11. The objectives or plans for each programme phase are revised as necessary.	Teachers of the corresponding programme phase.	
12. Specific objectives are prepared and reviewed.	Teachers of the programme phase; Programme Committee	Heads of the Departments concerned
13. Teaching and evaluation methods (immediate and long-term) are selected and the required administrative support is planned and organised.	Teachers of the phase with the help of the Committees of Teachers and education specialists	Programme Committee and Heads of the Departments concerned
14. Teaching and evaluation methods are implemented.	Teachers of the phase with the help of the Programme Committee	Heads of Departments

Action	Taken by	Obtain agreement from
15. Evaluation results are collected. Data pertaining to individual student evaluation and evaluation of the teaching given are handled and interpreted separately through appropriate channels.	Committee of Teachers and education specialists	
16. Recommendations for improving the programme are developed. They are based on the evaluation data and other sources of information and advice.	Programme Committee, Committee of Teachers, School Administration	Appropriate individuals and groups.
17. The necessary changes are implemented.	Programme Committee, Committee of Teachers.	Faculty Council, Heads of Departments

qualities of a programme committee coordinator

He need not necessarily always have all the following qualities, but if you had to choose at some time or another between two colleagues it is suggested that you choose the one most resembling this description.

He should be:

- available
- motivated
- have the support of the school administration
- accepted by the students

and also have as many as possible of the following qualities:

- Vast knowledge and wide professional experience
- Recognised skill in educational planning
- The personality of a leader
- A reputation as a research worker
- Years of experience as a faculty member
- A reputation as an author

P.S. If you know such a person
please telephone immediately
to W.H.O. Thank you.

advantages and limitations of a systematic approach

Possible advantages of a systematic approach

1. It provides a mechanism making possible a study planned and organised in advance.

2. When it becomes really operational it should be more effective than the traditional approach since it can be improved by the feed-back.

    2.1 If it is well organised, it may permit greater flexibility in organising the use of time of students and teachers.

    2.2 Allowance can be made for certain individual variations in students' rate and mode of progress throughout the teaching programme.

    2.3 It may prove possible to train more students at the same cost if the system is carefully structured.

Possible disadvantages

3.1 Teachers must spend more time on planning and evaluation, especially during the first years following the adoption of the system. In many respects it is more expensive *at the outset* to try to construct a new system rather than to keep to the old one.

3.2 It seems clear that a nucleus of teachers will have to spend a greater part of their time in planning, managing and evaluating the programme. These activities could be organised using a rotation system covering three or four years, so as to distribute the work and give teachers an opportunity to become familiar with the teaching methodology.

Necessary supporting elements

4.1 A school administration and departmental heads willing to delegate some of their responsibility and authority to a new programme planning and management system.

4.2 Budgeting of funds in a manner consistent with the teaching programme and the distribution of decision-making authority.

4.3 A review and, where necessary, a revision of academic regulations concerning the hierarchical system in operation and the promotion of teaching staff so that teachers' contributions in planning and implementing the teaching system will be duly recognised when decisions are taken on salary increments and academic rewards.

4.4 A faculty council and a programme committee that are skilled in arranging to co-opt, "neutralise" or "remove" (by promoting, but elsewhere) key opponents to the plan.

* * *

The object of education is not to shape citizens to the uses of society, but to produce citizens able to shape a better society.

* * *

To train large numbers without loss of educational quality

Promote and develop the use of self-learning methods and material

and

have students share teaching responsibilities*

The key to effective learning is to adapt learning activities to the needs of individual learners

---

*Cf. Students Learning From Students. WHO Document WHO/EDUC/80/181

specification tables

A *specification table*, or double-entry table, is a kind of check list enabling you, when you prepare a programme or an examination, for example, to make sure that the appropriate parameters have been taken into account. It sometimes happens that even the best-intentioned teachers who have made an effort to define educational objectives go on to prepare a programme or an examination which, when analysed, appears to neglect them completely. In order to "force" yourself to bear these objectives in mind, you would be well advised to make use of specification tables; they will help you to relate each part of the programme directly to a given objective. In other words, "every part of a programme or an examination should correspond to an objective", and "every objective should have a corresponding element in the programme or examination". *That is the price of relevance.*

How to use a Specification Table

One example of a specification table (p. 1.27) has enabled you to have a brief overview of both a teaching programme and a series of examinations.

A second example (p. 2.38) showed you how to compare different evaluation methods using selected criteria.

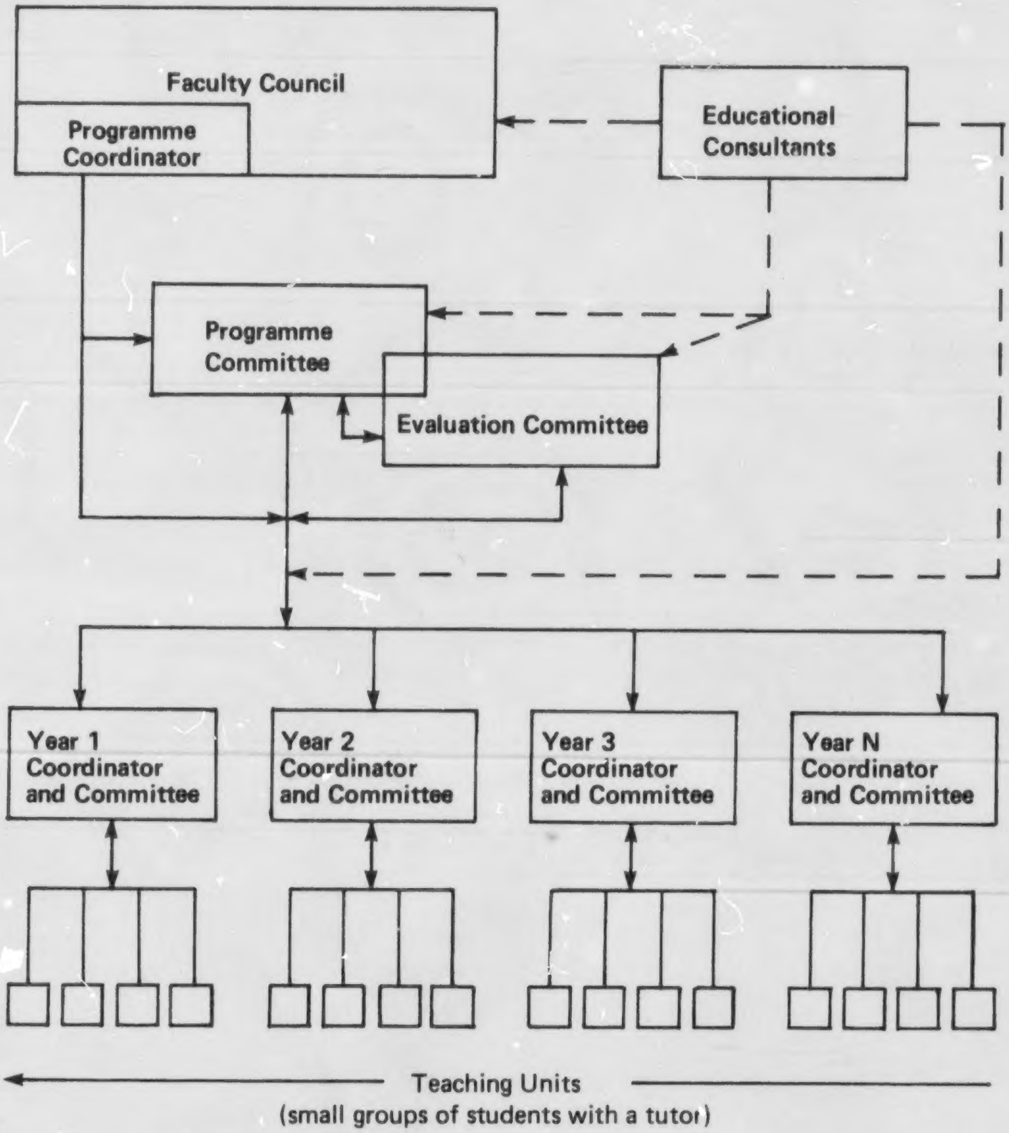
A third example (in this chapter, p. 3.58) has helped you to compare two teaching methods, using other selected criteria.

A fourth example will be given in the next chapter (pp. 4.54 – 4.57). By means of another exercise, you will be able to make a qualitative analysis of a series of tests (the exercises in the *Handbook*).

These four exercises will have allowed you to see what an extremely useful tool a specification table may be in educational decision-making.

Remember to construct one whenever that seems advisable.

Example of organizational chart of an integrated programme planning mechanism


Faculty Council
Programme Coordinator
Educational Consultants
Programme Committee
Evaluation Committee
Year 1 Coordinator and Committee
Year 2 Coordinator and Committee
Year 3 Coordinator and Committee
Year N Coordinator and Committee
Teaching Units
(small groups of students with a tutor)

Key: Solid lines represent direct lines of administrative decision-making
Dashed lines represent advisory functions

obstacles to change

- Dynamic conservatism
- Institutional bureaucracy's built-in resistance to change
- Complexity of programme change
- Lack of institutional resources
- Lack of model upon which to base changes

J. Bryant

3.75

EXERCISE

Describe in chart form the type of organisation (commissions, committees, councils etc., with a list of the functions of each) which you think could be set up in the institution where you are teaching with a view to introducing (or improving) a *relevant programme*. Compare your chart with that on page 3.74.

> The classically rigid, inflexible departmentalization of faculties of medicine is probably the greatest single obstacle to educational reform.
>
> D. Maddison
> Dean, Fac. of Med.
> University of Newcastle, N.S.W., Australia

EXERCISE

Describe the obstacles you are likely to meet in setting up the type of organisation that you described on the preceding page, *and* the tactics you could use to overcome them.

Obstacles	Tactics

> An educational system will never achieve its full potential in the preparation of health professionals if it continues to guard jealously individual and departmental autonomy and to maintain a lofty aloofness from the health care system.
>
> G.E. Miller 1977

EXERCISE

(Check your answers on page 3.84)

Important: *Select only one reply to each question.*

Question 1

According to present educational trends, all the following statements are true, *except one*. Which one is false?

A. A systematic approach facilitates the choice of learning situations and evaluation methods.

B. The modern trend in educational practice is to transfer part of the teacher's role to the student.

C. Present educational trends seem to lay more stress on the student than on the teacher.

D. The student's judgment of the value of an educational programme is perhaps more valid than that of the teachers.

E. The primary role of the teacher is to transmit knowledge in the field of his specialty.

Question 2

Learning is made easier by an educational situation in which the teacher does all the following things *except one*. Which is inappropriate?

A. The teacher encourages the student to be active.

B. The teacher helps the student to discover concepts.

C. The teacher makes frequent checks of the student's level.

D. The teacher encourages individual learning.

E. The teacher gets the student to participate in educational decision-making.

Question 3

The many definitions of learning include all the following characteristics *except one*. State which.

A. A more or less permanent change occurs in the student's behaviour.

B. It is not directly observable.

C. Repetition by the student is a favourable factor.

D. The role of the teacher is primordial.

E. Motivation is an essential element.

Questions 4 to 7

Indicate for each of the following questions whether reference is made to:

A. an epidiascope
B. an overhead projector
C. a slide projector

Question 4

Can project outlined figures (or letters) on a transparent support (25 x 25 cm) so that they can be read in a lighted room.

Question 5

Can project outlined figures (or letters) on opaque paper so that they can be read in a darkened room.

Question 6

Is also called a diascope.

Question 7

Can project outlined figures (or letters) on a transparent support (50 x 50 mm; 24 x 36 mm) so that they can be read in a darkened room.

Question 8

A self-learning package must include at least three of the following elements. Indicate which.

1. A short statement of the subject.
2. The statement of the educational objectives.
3. A definition of the required level.
4. The full documentation needed.
5. Diagrams, photographs or slides.
6. A formative measuring device.

Reply:
A if the elements are 1, 2 *and* 6
B . . . . 1, 3 *and* 5
C . . . . 2, 4 *and* 6
D . . . . 3, 4 *and* 5
E . . . . *any other choice*

Question 9

Upon which of the following criteria for the choice of teaching material does the quality of relevance depend?

The material should:

A. be appropriate to educational objectives;

B. promote active student involvement;

C. be appropriate to the students;

D. be of good technical quality;

E. be very cheap.

Questions 10 to 16

If a lecture course is denoted by X, and a self-learning package by Y,

Reply:

A if the method described is consistent only with X

B . . . . Y

C . . . . with both X and Y

D . . . . with neither X nor Y

Question 10

A method which places the student in an active situation.

Question 11

A method which allows the student to attain a given educational objective.

Question 12

A method which provides the student with a feed-back of information on his progress.

Question 13

A method which requires the student to work in a team.

Question 14

A method which allows the student to work at his own pace.

Question 15

A method which appears to be economical in time and in means.

Question 16

A method which emphasises self-measurement.

Question 17

Among the educational objectives to be reached by a class of 250 students of the same year is the following: "to be able to measure the height when lying down of a new-born baby using a portable scale". Criterium: maximum error of ± 0.5 cm in 90% of measurements.

Supposing that each student has to spend eight weeks in a MCH (Maternal and Child Health) centre in the course of his training, *list in order of decreasing efficiency* the following four teaching methods:

1. A 30-minute lecture to the 250 students in a lecture room, followed by a demonstration by the instructor.
2. A 30-minute lecture followed by practical exercises of the technique by the students in groups of 25, each group spending two hours with the instructor in rotation.
3. A demonstration of the technique by an instructor followed by practical exercises by the students in groups of 25, each group spending two hours with the instructor in rotation.
4. Each student receives a handout with diagrams during the training period; valid certifying tests are checked by the instructor on request by the student.

Reply:

A if the order of decreasing efficiency is	1 2 3 4
B	2 4 1 3
C	3 1 4 2
D	4 3 2 1

Question 18

When preparing a part of the programme whose aim is to stimulate the student's originality in looking for solutions to problems, the most suitable group of learning activities is:

A. The students participate in courses and demonstrations by teachers with a very creative attitude who are themselves excellent research workers.

B. The students participate in laboratory and field exercises during which they reproduce basic experiments.

C. The students participate in a series of hospital, field and laboratory activities, and must present the solutions arrived at in clear terms.

D. The students participate in hospital, field and laboratory activities and must write a report describing the experiments in which they have participated.

Question 19

According to L. Weed, all the following statements are true *except one*. Which is untrue?

A. Length of training should be fixed in advance for a given group of students depending on the type of degree.

B. The student should be able to define his own work objectives within an organised system of medical care.

C. An understanding of basic principles should result from the students' confrontation with practical problems.

D. The lasting ability to recall depends for the most part on repeated use.

Question 20

A programme specification table (double-entry table):

A. Is a table giving details of a teaching programme (time-table, premises, etc.)

B. Is a list of contents giving detailed instructions concerning programmed learning.

C. Is a control sheet for checking the specificity of the educational objectives.

D. Is a control sheet for checking whether the elements of the programme are related to the educational objectives.

Suggested answers for the exercise on pages 3.77 – 3.83

Questions	Suggested Answers	If you did not give the right answer, reread the following pages.
1	E	3.05 – 3.12, 3.18 and 3.19
2	C	3.25 – 3.31
3	D	
4	B	3.42 – 3.47
5	A	
6	B	
7	C	
8	C	3.48 – 3.53
9	A	3.53
10	B	3.41 – 3.53
11	C	
12	B	
13	D	
14	B	
15	A	
16	B	
17	D	3.41 – 3.59
18	C	
19	A	3.62 – 3.66
20	D	3.74

Congratulations! You have attempted to work out a programme corresponding to your subject.

But be careful

- Make sure once more that it agrees with the professional functions and tasks
- Pay unfailing attention to relevance
- Effective teaching can be more dangerous than no teaching at all if it is not really relevant

test and measurement techniques

4

the practice of test and measurement techniques

This fourth chapter reviews a certain number of measuring instruments, their advantages and limitations, and how they should be used. It shows the wide range of such instruments and the importance of choosing them in accordance with the educational objectives to be measured. It is stressed that every teacher should make a certain minimum of statistical calculations when he carries out an item analysis of a test.

Those with a deeper interest in these problems are strongly advised to consult the following publications:

Public Health Papers – WHO

- No. 36 A review of the nature and uses of examinations in medical education, 1968.
- No. 52 Development of educational programmes for the health professions, 1973.
- No. 72 Assessing health workers' performance: A manual for training and supervision, 1980.

After having studied this chapter and the references indicated, you should be able to:

1. Indicate the different elements that should be considered in the evaluation of a teaching programme.

2. Indicate the different elements that should be considered in the evaluation of the educational objectives of a teaching programme.

3. Define the advantages and limitations of a system of evaluation of teaching *by* the students.

4. Construct an observational rating scale and/or a practical test to evaluate the behaviour of a student in the domain of communication and/or practical skills.

5. Propose a question for a written (open-book) examination of the "essay" type or a series of six short, open-answer questions and indicate the norms of performance permitting objective marking (marking table).

6. Draw up three multiple choice questions (MCQ) in the domain of intellectual skills – at least two of the objectives must measure an intellectual process superior to level 1 "simple recall" (either level 2 "interpretation of data" or level 3 "problem-solving").

7. Indicate the advantages and limitations of a programmed examination.

8. Define the following terms: prerequisite level test, pre-test, interval test, comprehensive, pre-final; indicate their purpose and the stages at which they are set.

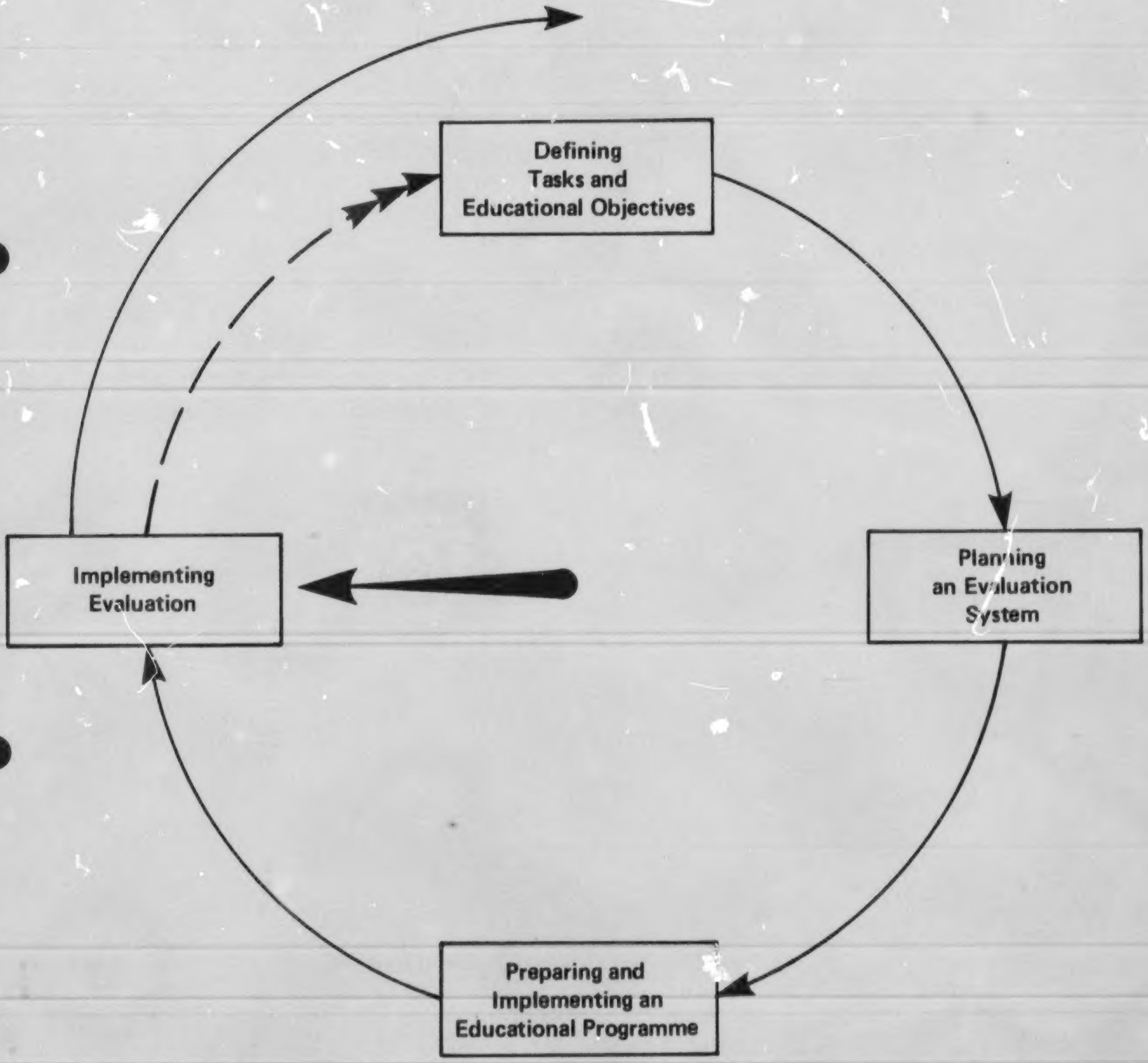
9. Explain the difference between a *relative* and an *absolute* criteria test.

10. Calculate the acceptable pass level for a MCQ examination and establish the scoring criteria and norms which permit determination of the passing grade of a mini-test (made up of the questions mentioned in objectives 5 and 6).

11. Do an item analysis of a question (calculate the difficulty index and the discrimination index) and draw the relevant conclusions.

12. Construct a specification table for an examination.

the educational spiral


Defining
Tasks and
Educational Objectives
Planning
an Evaluation
System
Preparing and
Implementing an
Educational Programme
Implementing
Evaluation

why evaluate?

Society, which finally pays the bill for health activities, relies on us to train health personnel to perform a social function corresponding to the health needs and demands of the community they are to serve.

Training centres for health personnel form an integral part of society, and must be prepared to operate *within* and *for* that society.

Health activities are of a nature to stimulate social awareness and to provide leverage for social development. The following are some of the questions that must be asked in any attempt to discover whether training centres go to sufficient lengths in preparing the different kinds of health personnel and giving them a training that is "pitched" to meet the health needs of our societies.

- Do the graduates think and behave in terms of *health* rather than of *disease*? That is to say, do they apply techniques of prevention and health promotion and not only those of cure and rehabilitation?
- Do the graduates think and behave in terms of family and ***community***, rather than in terms of the individual sick patient?
- Do the graduates think and behave in terms of membership of a ***health team*** consisting of doctors, nurses and other health workers as well as social scientists and others?
- Do the graduates think and behave in terms of making the best and ***most effective*** use of the financial and material resources available?
- Do the graduates think and behave in terms of ***their country's*** patterns of health and disease, and the relevant ***priorities***?

Consider the institution where you are working – and reflect on the above questions. If you can reply "yes" to all of them, then the essential has been achieved.

If, on the other hand, you cannot unreservedly say "yes" to certain of them, it is urgent for you to reconsider the orientation and the training programme of the school concerned.

To that end, several steps can be suggested:

1. Evaluate the programme as a whole.
2. Evaluate the general and intermediate educational objectives.
3. Have the students evaluate certain aspects of the curriculum.
4. Evaluate the students' level of performance.

guidelines for evaluating a health personnel training programme — summary description

The following guidelines are meant to be both general and comprehensive. The evaluator must adopt a realistic approach and decide in each case what is essential in any particular situation.

The guidelines take the form of a series of operations but, obviously, in practice these will often be carried out in a different order. What is essential, in any evaluation study, is for the evaluator to be constantly re-examining the information obtained, reformulating his questions and, even more important, revising his judgments. He is thus often obliged to retrace his steps and, ideally, should review his whole orientation.

The guidelines are presented under four main headings corresponding to the four phases of the evaluation:

I Orientation

II Design of the evaluation

III Gathering information on the programme and its effects

IV Analysis and reporting

Guidelines

Phase I — Orientation

1. Determine the general characteristics of the teaching programme.

2. Ascertain the general characteristics of the administrators, teachers and students.

3. Determine the financial resources available for the programme and its physical facilities.

4. Clarify the aims of the proposed evaluation.

5. Make an inventory of what information is readily available about the teaching programme.

6. Determine the resources available for the evaluation and fix a time limit for its completion.

7. Clarify the evaluator's role and that of the other persons taking part in the evaluation.

8. Make a preliminary appraisal of the nature and the feasibility of the proposed evaluation.

Phase II — Design of the Evaluation

9. List the questions and issues to be considered.

10. Determine the appropriate sources of information and the procedures for its collection.

11. Design the evaluation.

12. Draw up an evaluation schedule.

13. Draw up an evaluation budget.

14. Obtain feedback check on the evaluation design, schedule and budget.

Phase III — Gathering information on the programme and its effects

(a) *Context and objectives*

15. Describe briefly the context in which the programme operates.

16. Define the objectives by drawing up a list

(i) of the future functions, taking account of the main health problems and the tasks and responsibilities deriving from each, *and*

(ii) of the training objectives, taking account of the principal tasks the student should be able to perform satisfactorily at the end of his training.

(b) *The characteristics of the students on enrolment*

17. Ascertain the students' characteristics that are likely to affect their performance as learners and subsequently as health workers.

18. Gather information about the students at the beginning of their training.

19. Make a summary of the characteristics of the student group(s).

(c) *Resources and training processes*

20. Make an inventory of the resources available for the programme and describe how they are allocated.

21. Examine and record the training processes used in the programme.

22. Make a summary of information relating to students' experience, using as themes the principal tasks and role models.

(d) *Effects and impact of the programme*

23. Ascertain the effects of the programme that are to be evaluated.

24. Describe and make a critical examination of the assessment procedures already in use in the programme.

25. If those methods are not adequate for the purposes of the present evaluation, develop and apply others.

26. Work out a set of procedures for observing and describing the long-term impact of the programme, if that is to be evaluated.

Phase IV – Analysis and reporting

27. Prepare a concise description of the programme using the information gathered in the course of Phase III.

28. Analyse the relationship between the various aspects of the programme.

29. Prepare an evaluation report recapitulating the qualities and achievements of the programme, the problems and difficulties encountered in carrying it out, and the available options or courses of action for its improvement.

□ □

For further details you are advised to read WHO Offset Publication No. 38 ***Guidelines For Evaluating A Training Programme For Health Personnel*** by F. M. Katz (WHO), Geneva, 1978)

or

Evaluation of Educational Programmes in Nursing by Moira Allen (WHO, Geneva, 1977)

□ □

points to consider in assessing the extent to which programme changes foster closer relationships between schools for health personnel and the wider society

1. Are changes in the government's priorities concerning health care more clearly understood by the programme planners inside the school?

2. Does the school now respond more swiftly and appropriately to any changes in national planning and priorities?

3. Does the school now work more harmoniously with the "consumers" of the trained personnel, i.e. with the relevant government agencies and the population?

4. Is direct feedback from (recent) graduates' "on-site" performance used as a criterion in assessing the strengths and weaknesses of the (new) curriculum? Is the school responsive to this type of feedback?

5. Are the various schools for health personnel within the whole national system learning from one another and assisting each other to replicate successful changes and progressively eliminate those which do not seem so successful?

6. Is the course content of the (new) programme *really relevant* to the common health problems of the country? How could it be made more relevant?

7. What observable changes have taken place in

(i) patterns of mortality and morbidity

or

(ii) the responsiveness of people to the prevention of disease and disability?

Could such changes be the result of the programme changes?

8. Are consumers more satisfied with the quality of health care delivered by the health personnel trained according to the (new) programme?

9. What are the principal forces that have accelerated the processes of realistic, valuable programme change and development? What have been the major restraining forces on development? How might accelerating forces be strengthened and restraining forces altered?

Based on a paper by P. Blizard, WHO, New Delhi.

□ □

For each main question try to reply in one of the following ways

Yes	–	I have good reason to believe so, and I have even obtained some evidence to that effect.
No	–	I do not think that it is true.
+/-	–	It is very possible but I have no facts to prove it.
?	–	I am unable to reply to the question.

□ □

points to consider in assessing the effectiveness of programme changes

— in terms of improvement in the administration and functioning of schools for health personnel

1. Has the (new) programme been based on a careful study of the skills needed (list of tasks) by health personnel in the community they are destined to serve?

2. Have student failure rates and drop-out rates been reduced? To what extent?

3. Has the time from initial enrolment to final graduation been reduced? To what extent?

4. Has the volume of content in the (new) programme been reduced in comparison to what it was previously? To what extent?

5. Have there been reductions in the financial and economic cost "per graduate"? To what extent?

6. Are scarce teaching staff and associated facilities more effectively and efficiently used? In which particular respects?

7. Is the content of the various subject areas vertically and horizontally integrated? What are the costs and benefits of that integration?

8. Are collaboration and cooperation between the various departments seen as an easier, simpler process than before the programme changes were made?

9. Have positive (or negative) effects been observed in the allocation of resources between teaching, research and administration?

10. Have changes taken place in the teachers' conditions of work so that they can now spend more time and energy on their teaching and related responsibilities? Have such changes been an improvement? If so, why?

11. Have locally organised teacher education programmes had some effect? If so, which?

12. Has the local education bureau (if one exists) contributed to the changes that have taken place? In what ways could the functioning of the bureau be improved?

13. Have administrative tasks become simpler and easier or have they become more difficult, time-consuming and complex?

14. Are the roles of the chief administrator (Director, Dean, etc.) and other senior administrators now clearer, easier and more precise or have they become less precise and more difficult?

Based on a paper by P. Blizard, WHO, New Delhi.

* * *

For each main question try to reply in one of the following ways

Yes – I have good reason to believe so, and I have even obtained some evidence to that effect.

No – I do not think that it is true.

+/- – It is very possible, but I have no facts to prove it.

? – I am unable to reply to the question.

* * *

points to consider in assessing the effectiveness of programme change

– in terms of improvements in teachers' performance

1. Are the tasks involved in teaching the new programme seen by teachers as more interesting, relevant and rewarding?

2. Is the preparation of course content seen as a clearer and easier task, notwithstanding the possibility that it may be more time-consuming?

3. Have teachers improved their capacity to "facilitate" students' learning, i.e. have they developed the skills necessary to help students learn effectively?

4. Have there been demonstrable improvements in the programme for training new teachers to teach more effectively?

5. Do teachers now spend more time, effort and energy (in productive ways) on their tasks as teachers?

6. Do teachers actually *use* the skills they have acquired during training programmes when they are working with students?

7. Have there been any negative effects on teachers' other roles?

– and in terms of students' performance

1. Are students provided, during their studies, with a greater volume of information and variety of learning activities?

2. Do students retain a greater proportion of the information and skills they have acquired?

3. Do students show an improvement in their ability to use these skills in practical health care situations?

4. Do students now show more initiative and independence in their learning habits, during their time in school, and in the later practice of their profession?

5. Do students show an improvement in their willingness and ability to keep up to date as regards their professional competence (and under adverse conditions)?

6. Are students now more actively involved in the tasks and processes of learning within the new programme?

7. Do students now spend more time, energy and effort in their learning activities, and generally work harder?

8. Does the working (and content) of the new programme provide a more interesting, exciting and rewarding experience for students?

9. Do students play a fuller, more active, more rewarding and more useful role in programme planning, implementation and evaluation?

Based on a paper by P. Blizard, WHO, New Delhi.

guidelines for evaluating general and intermediate educational objectives

How can a training school for health personnel make sure that the teaching provided meets the needs and expectations of the population that the future graduates will have to serve? One of the best, but under-used, tools to ensure such relevance in teaching is the educational objective.

A WHO Study Group met in 1976 to consider the place of educational objectives in the training of the different categories of health personnel, and in particular to devise guidelines for evaluating such objectives.

The guidelines given below are concerned not only with the way in which the objectives are stated but also with the process by which they were developed. Were the objectives defined so as to reflect, for instance, the needs of health workers and of the consumers of their services? Does the statement of each objective contain an action verb clearly indicating what the student must do to show that he has attained the objective? Are the proposed objectives consistent with one another?

The guidelines are arranged under 20 headings. In most cases, the user can simply check one of the answers indicated. A space has been left at the end of each item for the user's remarks.

The report* of the Study Group, and especially the proposed guidelines, should be useful to administrators and teachers of schools for health personnel by helping them to define and evaluate educational objectives for their own use and for the benefit of their students.

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*Criteria for the evaluation of learning objectives in the education of health personnel. Report of a WHO Study Group. WHO Technical Report Series No. 608, 1977, 47 pp. (The Report is also published in French and Spanish.)

A. Persons involved in drawing up the objectives

1. Which of the following persons were involved in either developing or reviewing the objectives?

- Teachers (if so please state what disciplines or specialties)
- Practitioners (if so, please state what disciplines or specialties)
- Education specialists
- Students
- Administrators (education, health, economy)
- Consumers of health care (i.e. "patients")
- Other (please specify)

2. How was the final decision made concerning the adoption of the objectives?

- By me alone (if so, please explain why)
- By my administrative supervisor (if so, please explain why)
- By the chief institutional administrator (if so, please explain why)
- By an interdepartmental committee (if so, please explain why)
- Jointly (if so, please indicate who was involved)
- Other (please specify)

(Circle the answer(s) you wish to give, and add any remarks).

3. Please describe any steps taken to avoid the objectives being distorted as a result of pressure exerted by certain interested groups (specialties, teaching disciplines, or others to be specified).

Remarks:

B. Basic data and other reference information

4. Given that the objectives should reflect the actual health needs of the community, which of the following needs are reflected?

- Present and future health problems
- Present and future functions of this category of health worker
- Functions of other health workers
- Expectations of health care consumers
- Expectations of health care workers
- Interrelationship between health needs and other needs of society
- Official government health policies
- Structure of the existing and future health care system
- Available data and research on health care and health manpower
- Current health manpower planning

5. When the objectives were developed, which of the following factors were considered? (In each case, please explain how.)

- Cost to the community (in relation to community resources)
- Characteristics of students
- Available teaching facilities
- Cultural setting of the educational institution
- Existing educational system(s) and philosophies
- Orientation of political and professional organisations
- Other (please specify)

6. Does each objective describe a specific competence that is significantly related to the performance of one or more of the tasks of that health worker?

Yes or No

If "yes" please give one or more examples.

Examples:

7. Do the objectives represent an adequate sample of the expected professional competences?

Yes or No

If "yes", please indicate how the sample was derived.

Remarks:

Circle the answer(s) you wish to give, and add any remarks.

C. Characteristics of the objectives

8. Given that the educational objectives are by definition student-oriented:

- Do they relate to the actual work the student is going to do after graduation?

  Yes or No

- Do they describe what the graduate will be able to do (***using an action verb***)?

  Yes or No

9. Given that the objectives should be consistent with one another:

- Do some objectives contradict others?

  Yes or No

  If "yes" please give an example.

- Do some objectives support others?

  Yes or No

  If "yes" please give an example.

Remarks:

10. Are the objectives realistic with regard to:

- Characteristics of students?

  Yes or No

- Characteristics of teachers?

  Yes or No

- Facilities available?

  Yes or No

- Time available for learning?

  Yes or No

11. Given that the objectives should be directed towards significant results of learning in all domains (i.e. knowledge, skills and attitudes):

- Are some of them specifically designed to facilitate personal affective development?

  Yes or No

- Are some of them specifically designed to facilitate the development of intellectual enquiry?

  Yes or No

- Are some of them specifically designed to facilitate development of the "total person"?

  Yes or No

- Are some of them specifically designed to promote the development of competence (and, where appropriate, leadership competence) for team work?

  Yes or No

- Do some refer to development of research skills?

  Yes or No

- Does the set of objectives refer to the need for life-long self-learning?

  Yes or No

- Does the set of objectives refer to the need for life-long (continuous) self-assessment?

  Yes or No

- Does the set of objectives reflect the scientific base for problem-solving needed by that category of health worker?

  Yes or No

- Does the set of objectives reflect adequately the range of technical skills required from that category of health worker?

  Yes or No

- Do some objectives reflect the importance of the health worker's responsibility to society?

  Yes or No

- Do some objectives recognise the need to prepare the health worker to be responsive to new methods?

  Yes or No.

  If "yes", please give examples.

D. Intended use of the objectives

12. Has consideration been given to how the objectives will be used in your institution?

Yes or No

If "yes", please indicate what plans were made for their use.

Remarks:

13. If so, how was the final decision made concerning the use of the objectives?

- By me alone (if so, please explain why)
- By my administrative supervisor (if so, please explain why)

- By the chief institutional administrator (if so, please explain why)
- By an interdepartmental committee (if so, please explain why)
- Jointly (if so, please indicate who was involved)
- Other (please specify)

Circle the answer(s) you wish to give, and add any remarks.

14. Are students informed about the objectives?

- Students were given copies of the objectives.

  Yes or No

- Students have discussed them.

  Yes or No

  If so, under what circumstances?

- Students have not seen them.

  Yes or No

  If not, why not?

- Some of the students have probably seen them.

  Yes or No

  If so, why only some of the students?

Remarks:

15. Are teachers informed about the objectives?

- All teachers were given copies of the objectives.

  Yes or No

- Teachers have discussed them.

  Yes or No

  If so, under what circumstances?

- Teachers have seen them.

  Yes or No

  If not, why not?

- Some of the teachers have probably seen them.

  Yes or No

  If so, why only some of the teachers?

E. Usefulness of the objectives

16. As you examine the set of objectives, which among the following results do you believe *likely to be produced*?

- They will be achieved.
- They will facilitate student learning.
- They will facilitate an integrated approach to learning.
- They will facilitate a problem-solving approach to learning.
- They will facilitate evaluation.
- Other (please specify)
- They may not even be used.

Circle the answer(s) you wish to give, and, under "remarks", mention any facts in support of your opinion.

17. Has the existence of the objectives had any impact on any of the following aspects of the teaching programme?

- Teaching/learning activities (if so, please give examples)
- Evaluation methods (if so, please give examples)
- Other (please specify)

Circle the answer(s) you wish to give, and add any remarks.

F. Evaluation and revision of objectives

18. Are there provisions for a periodic review of the objectives?

Yes or No

If so, what is the review based on?

- Students' performance data.
- Operational research data.
- Evidence of changing needs.
- Other (please specify)

Circle the answer(s) you wish to give, and add any remarks.

19. If so, who is involved in the review?

- Teachers
- Practitioners
- Education specialists
- Students
- Administrators
- Consumers (i.e. "patients")
- Other (please specify)

Circle the answer(s) you wish to give, and add any remarks.

20. If the answer to question 18 is "yes",

- Does such a review facilitate programme changes?

  Yes or No

  (If so, please specify how.)

evaluation *by* students of programmes, teaching techniques and teachers[1]

Introduction

An evaluation made by students can provide the teacher with a most useful feedback of information on the quality of his teaching. Anyone who genuinely wishes to teach better should therefore seek ***his students' opinions***. That may be done simply by a friendly talk with a few students, but it is preferable to prepare and distribute a questionnaire. Such an evaluation questionnaire may cover the whole or only part of the teaching, and it is for the teacher together with the students to decide just what should be evaluated by them. It would, for instance, be very valuable for the teacher to know how the students regard any changes in the teaching routine such as a new organisation or the introduction of audiovisual material.

It may be noted that anyone who asks students to evaluate his teaching need not doubt the validity of their judgement. For a decade or so many psychometric studies have revealed the validity and the accuracy of student opinions as well as their close correlation with "objective" measurements of the instructor's effectiveness. The many biases which were ascribed to the evaluators, for example, the influence of sex, academic efficiency, (poor students/good students), level of studies (beginners, finishers) the status of the course (compulsory/optional) have all proved to be of ***negligible importance***.

Preparation of "simple" evaluation questionnaires

Once the teaching aspects which are to be evaluated have been determined, the evaluation questionnaire is drawn up.

This quesionnaire must comply with several essential requirements as concerns the wording of the statements, the scale of the answers and the method of "administration".

1. Wording of the statements

- The statements should be clear, simple and directly related to what it is desired to measure;
- statements which would be accepted straight away by everyone should not be included;
- statements containing double negatives should be rejected;
- each statement should contain a complete thought;
- the terms "uniquely", "solely", or "most of the time" should be avoided or used in moderation;
- a statement should preferably be in the form of an affirmation concerning which the student is asked to express a favourable, neutral or unfavourable opinion;
- the number of statements should be limited. Too long a questionnaire wearies the evaluators and this inevitably affects the validity of the answers. It is estimated that a questionnaire should not exceed 60 statements.

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[1] **Summary of a paper presented by J.-F. d'Ivernois, 21 May, 1975, Séminaire de Pédagogie universitaire, Laval University, Quebec.**

1. Examples of statements

"Specific objectives make it possible to identify what is most important in the content to be learned".

"The time allocated for a learning activity is sufficient for you to achieve all the objectives aimed at by that activity".

2. Scale of answers

The student should not have to answer merely "yes" or "no" to a statement, for such an answer provides only scanty or dubious information.

That is why preference is given to the use of scales of answers comprising 5 degrees (and sometimes 7 or 9) (see below).

Students should enter against each statement (or on an answer-form or card) the numbers corresponding to their opinion. It is advisable to provide for an additional answer figure (0 to 9) corresponding to a *lack of opinion* concerning the statement.

The answers scale should be explained to the students at the beginning of the questionnaire, or mentioned against each statement. It is also as well to leave a space below each statement for comments by the student.

3. Method of administration

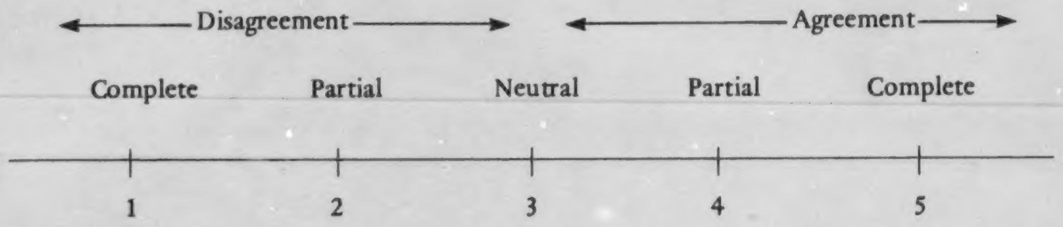
A person's reaction to a given stimulus is first immediate and then delayed. If the questionnaire is handed out immediately after the event the results observed will be different from those obtained if the questionnaire is administered later. These differences in distribution are attributable to the *effect of experience* (also called the "practice effect"). The teacher should therefore take this factor into account when he envisages the administration of an evaluation questionnaire.

4. Analysis and interpretation of the answers

Processing (machine or manual) of the answers is simple. The answers to a given statement are then analysed by calculating the number of students (frequency) who have replied by 1, 2, 3, 4. 5 or 9 to that statement. The *mean* of the answers to the statement can also be calculated. To do this one point is assigned to an answer "1"; two points to an answer "2"; three points to an answer "3"; etc. The total of the number of points obtained for the statement is calculated and then divided by the number of students answering. To make interpretation easier, the trends (favourable, unfavourable) should be grouped together.

A scale ranges from *disagreement* (1 and 2) through *neutral** (3) to *agreement* (4 and 5)

Example:



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*For certain questions, it may be considered that a participant in an educational workshop, for instance, should be obliged to adopt a definite position and not take refuge in neutrality: the same applies to the position "no opinion".

Example

Statement: "The time allocated for a learning activity is sufficient for you to achieve all the objectives aimed at by that activity".

Numbers of answers: 100

Distribution: 1 : 3 3 : 5 5 : 69
2 : 2 4 : 21 9 : 0

Trends: 1 – 2 (disagreement) : 5
4 – 5 (agreement) : 90

Mean of answers : 4.51

- **Construction of complex questionnaires**

1. "Simple" questionnaires enable the students' perception of ***reality*** to be measured. It is for the teacher who analyses the answers to deduce from them what the students desire or expect, but this interpretation may leave certain grey zones. If, for example, the statement submitted is: "the course provides an adequate coverage of the subject matter" and 40% of the students disagree with that statement then it is clear that these students feel that the course does not cover ***sufficient*** subject matter. On the other hand, what proportion of the 50% of students who ***agree*** with the statement think that the subject matter covered is not only adequate but ***even too much***?

"Complex" evaluation questionnaires, such as the one devised by F. Gagné, covering the perception by the students of the teacher/students relationship have the aim of measuring as unambiguously as possible both the students' perception of ***reality*** and their level of expectations.

In a questionnaire of the Gagné type, each statement should include:

- a ***title***;
- a ***detailed description*** of the aspect to be measured;
- A 5-degree ***scale*** with ***qualitative expression*** of each degree;
- ***Two questions***: the first (a) measuring the student's perception of reality and the second (b) the level of his expectations.

Frequency of examples: What is required is to measure the frequency of examples putting in concrete form the more or less abstract concepts presented in the course.

- *Very rare* examples
- *Rare* examples
- *More or less frequent examples*
- *Frequent examples*
- *Very frequent* examples

Question A: Where would you place this course on the evaluation scale?

Question B: Where should it be in order to satisfy you?

2. Analysis and interpretation

The *means* of the answers to questions A (Reality) and B (Expectations) are calculated for each statement. Interpretation of these two means is easy since degree 1 on the scale shown usually corresponds to the minimum frequency or intensity, while degree 5 corresponds to maximum frequency or intensity (see example). The *deviation* between these two means is then calculated (S score). This deviation shows the dissatisfaction of the students, a dissatisfaction expressed in terms of a *lack* or an *excess*. The lower the value of the S score (the nearer it is to zero) the more the particular aspect measured is deemed satisfactory. The S scores of several statements can be compared with one another for one and the same group of students. Furthermore, all the S scores in the questionnaire can be added together so as to give an overall and valid measurement of satisfaction or dissatisfaction. Finally, it should be noted that a questionnaire of the Gagné type can be adapted to different educational methods, e.g. lecture courses, small group activities, teaching by computer, by television, etc.

Example of Interpretation of a Questionnaire of the Gagné type.

Statement	Title of statement	Mean : Reality	Mean : Desires	Deviation (S score)	Interpretation
4	Variation in educational approach	2.39	3.74	1.52	Dissatisfaction
13	Active student participation (+ or −)	4.26	4.65	0.39	Satisfaction
27	Number of references to be consulted.	4.51	3.27	1.24	Dissatisfaction (excess)

□ □

On this subject, see also ***Evaluation of teachers and teaching effectiveness*** by Christine H. McGuire in WHO Public Health Paper No. 61, Geneva, 1974.

□ □

EXERCISE

List the advantages and limitations of this type of evaluation of the educational process *by* students.

Advantages	Limitations

evaluation of students' level of performance

The following pages contain some examples of tests. In each case you are advised to practise making up a test on a subject with which you are familiar, after having selected a specific educational objective whose achievement can be effectively measured by the test in question (i.e., the test must be valid).

	pages
Real or simulated practical test	4.22
Execution of a project	4.22
Observational rating scale	4.23
Oral test	4.27
Essay	4.28
Short, open answer questions (modified essay question, and restricted response test)	4.28
Multiple choice questions (MCQ)	4.31
Programmed examination	4.41

Excellent examples may be found in

WHO Public Health Paper No. 72 "Assessing Health Workers' Performance: A Manual for Training and Supervision", Geneva, 1980

and

Catalogue of instruments for the performance assessment of Health Workers , HMD/81.6, WHO, Geneva, 1981.

assessment of professional skills

Real or simulated practical tests

These tests are based on the ***direct observation*** of a professional task (cf. page 2.22).

A practical test is one that requires the student to perform a professional task in an environment and under conditions the same as or similar to those in which he will have to perform it in his future professional life.

For example:

The student is required to weigh a baby in an MCH centre and note the result on the appropriate record card.

The student measures the blood pressure of another student.

The student is required to prepare a blood slide.

It is advisable to use this technique when the main component of an educational objective is a practical skill or an interpersonal relationship.

The disadvantages of this type of test are: the relatively high cost in teaching personnel in view of the time required to observe each student's work; the risk of the patient being placed in a disagreeable situation; the difficulty in standardising the test conditions; and the heavy administrative task of coordinating the time schedules of teachers, students and services.

Execution of a project

These tests are based on the ***indirect observation*** of a professional task.

A project execution test is one that requires the student to carry out an activity, in a variable period of time, that results in a ***product*** which is to be evaluated by the teacher.

For example, the product might be a concrete piece of work such as a dissection, a dental impression or a histopathological slide; in addition to practical skills, certain intellectual processes can be evaluated by projects in a written form, such as a research report or a bibliography.

It is advisable to use this technique when the main component of an educational objective is a complex practical or intellectual skill, and when the product is more important than the student's manner of working.

The disadvantages of this type of test are: the relatively high cost in teaching personnel responsible for evaluating the result of the project; and the need to establish a relationship of confidence with the student to avoid cheating.

EXERCISE

Draw up a practical test, either real or simulated, or else a project test, designed to assess a professional task (pp. 1.41 or 1.52 or any task chosen by you), and keeping in view the criteria of *validity, objectivity and practicability* (re-read p. 2.38).

Evaluate your results by constructing a specification table (see p. 3.73).

assessing attitudes by observational rating scale

Everybody agrees that the attitudes of the physician and the other members of the health team to the patient and the patient's family are of the greatest importance.

Yet when one observes the way in which students' skills in this matter are assessed, it is seen to be so inadequate that one cannot help being struck by the paradox of the situaton.

It must be recognised, in all humility, that this is the most difficult domain in which to make assessments, and the efforts of research workers in this field deserve every support. In a book such as the present one, only a superficial treatment of this subject can be given, and the reader should refer to more specialised publications (see bibliography).

1. Selection of students and assessment of attitudes

The term "attitude" denotes certain constant traits in an individual's ways of feeling and of thinking, and his predispositions towards action with regard to another person such as a patient or collaborator. An attitude is generally considered to be a *hypothetical construct* which is not directly observable but can be inferred from speech or outward behaviour. The inventory of attitudes constitutes the *operational definition* of the attitude.

Attitudes are probably not innate. The whole personality structure of an individual, and thus the whole of his behaviour, is constituted by a complex of interlinked attitudes. In its present state, research seems to indicate that it is illusory to expect to be able to change attitudes in the relatively short period of a programme of higher studies. Perhaps then it would be preferable to make sure, by a suitable selection process, that students *at the beginning of their studies already possessed* the appropriate attitudes for their future profession. It must however be remembered that the definition of those attitudes may easily be contestable; the preparation of such definitions must therefore be a *group activity free from arbitrary influences*. It would be wise, moreover, to conduct carefully controlled experiments before taking any action based on the results of attitude assessment.

The situation being what it is, *the drawing of lots may not unreasonably be considered as a method of selection.**

2. Observational rating scales during studies

The method of observational rating scales requires the repeated and standardised *direct observation* of students' activity over a long period (several months) and in natural professional situations such as an outpatients clinic, a consulting room, a laboratory, or a hospital ward. The rating scales are used in evaluating the students' reactions, attitudes and activities. The fact that the scales are very easy to use often leads people to forget the many possible sources of error in such evaluations.

If a student is being observed when examining a patient, and if it is wished to make a separate evaluation of how he gains the patient's confidence, the following rating scale may be used.

The student has taken all the necessary precautions, and the patient appears completely relaxed	5
The student has taken the necessary precautions and has reassured the patient several times	4
The student has made an effort, and has followed it up	3
The student has made an effort, without following it up	2
The student seems to be quite unaware of the problem	1

---

*The selection of students is made by drawing lots in the Netherlands.

an example of an attitude rating scale

Task/Educational Objective: During a telephone conversation, to reassure the mother of a newly hospitalised child

Attitudes	- 2	- 1	0	+ 1	+ 2
1. When giving the mother information on her child's condition	refuses to reply to the mother's questions	gives no information	gives inaccurate information	gives accurate information but does not reply to mother's questions	gives accurate information and replies to mother's questions
2. When giving a clear explanation of what has been done for the child	often uses medical terms without ever explaining their meaning	often uses medical terms and seldom explains their meaning	seldom uses medical terms but does not always explain their meaning	seldom uses medical terms and always explains their meaning	uses only terms that the mother can understand
3. When suggesting that the mother should see her child	refuses the mother's request to see her child	does not suggest that the mother should see her child	agrees when the mother makes the request	spontaneously suggests that the mother should see her child	spontaneously makes the suggestion and explains any precautions to be taken
4. When telling the mother how she can obtain information about her child's condition	tells her nothing	when the mother enquires, refers her to the nurse	when the mother enquires, tells her the visiting hours and the persons she should ask	spontaneously informs the mother how to obtain information about the child's condition outside official hours	encourages the mother to come and obtain information about her child's condition outside official hours
5. When suggesting to the mother how a rupture of the mother/child relationship can be avoided	refuses to say how when the mother enquires	makes no suggestion	puts off the question until later	spontaneously suggests that the mother should stay at the hospital with her child	attempts to overcome the difficulties in the way of the mother staying with her child

Criterion: The student should score 7 out of 10 on the above rating scale

After Professor J. -P. Grangaud (Test and measurement workshop, Timimoun, 1977)

The above example uses one of the most frequently employed rating scales. Others may be found in ***The assessment of attitudes*** by Agnes G. Rezler, WHO Public Health Paper No. 52, Geneva, 1973, and in J. P. Guilford (1954) ***Psychometric methods***, McGraw Hill.

EXERCISE

Select a professional task (educational objective) whose main component is an attitude and construct a descriptive rating scale for its evaluation.

Task/Objective: The student should be able to: ______________________________

____

Attitudes	- 2	- 1	0	+ 1	+ 2

Criterion/acceptable level of performance: ______________________________

____

4.25

EXERCISE

Try once more — it is not easy. Show your first attempt to several of your colleagues separately; discuss it in a small group including users of health services

Task/Objective: The student should be able to: ______________________________

____

Attitudes	- 2	- 1	0	+ 1	+ 2

Criterion/acceptable level of performance: ______________________________

____

a few words about the traditional oral examination

Definition: An examination consisting of a ***dialogue*** with the examiner who asks questions to which the candidate must reply.

In its standard form, the oral examination is a ***closed-book test***. In ***that form*** it can evaluate only level 1 educational objectives (see page 1.19) in the domain of intellectual skills. Like traditional written examinations using short, open answer questions or MCQ, it provides a check on whether the student can express, more or less clearly, his knowledge of isolated facts or groups of facts that he ought to remember. Most often, it takes the form of a series of not necessarily interrelated questions. There is a dialogue only if the examiner so wishes.

It should be pointed out that, apart from its advantages and limitations which were described on page 2.30, this type of examination suffers from a scarcity of examiners who are really capable of making the best use of it in practice.

A better way of assessing a student's ability to communicate orally with another person is to use ***simulation*** methods, such as role playing or a telephone conversation, which are much nearer to actual professional tasks.

Personal Notes

long and short written questions

The use of the "essay question"

- Use "essay questions" only to evaluate a type of performance which cannot be measured just as efficiently by other methods (synthesis of a group of complex concepts, summary of a document, comparison of two phenomena, cause analysis, finding relationships, criticising the relevance of a concept, formulating a plan of action).
- Limit the problem posed so that it is clearly apparent to the candidate and define the structure of the answer.
- Employ terms that are as explicit as possible, such as "summarise", or "compare", "evaluate", "define", "arrange in order", etc. rather than "discuss" or "state everything you know", so that all the candidates immediately know what they have to do.
- Choose problems which call for careful consideration but whose solution can be briefly set out in the time allowed.
- Allow no choice among the questions set.
- *For every question, set out yourself the elements which*, according to you, *should appear in the answer* (scoring procedure).
- Mark papers anonymously.
- When two or more teachers correct the same test, they should *agree on the scoring procedure before the test and correct the results separately*.
- Use a point system of scoring based upon those elements that are expected to appear in the answers.
- Try out the scoring procedure on a few papers. Preferably, have *all* the teachers then read *all* the answers to a given question; or, if need be, have one of them read all the answers to a particular question in all the papers, have another teacher do the same for another question, and so on.
- Score the answers of all the students to one question before going on to the scoring of another question.
- Do not form a judgment of a candidate on the basis of only one question but calculate for each candidate a summative score based on the reading of several different essays, since such scores are more reliable than the score for any one essay taken separately.

Use of short, open answer questions

This involves series of questions drafted in such a way that the answer calls for a predetermined and precise concept. As their name indicates, the answer expected is short and can be expressed in different forms (open). Ideally, only one answer is acceptable no matter in what terms it is expressed.

The author of the question must define in advance (and in cooperation with colleagues) the answer called for by the wording of the question. If it appears that conceptually different answers will do for a given question then it should be reworded until that drawback disappears.

The pagination should allow the necessary space for the answer below each question. Marking is theoretically simple since the answer has been predetermined. In practice the frequency of difficulties arising from the conflicting views of two correctors is found to be of the order of 2%. There remain the problems of illegible writing,* absence of answers, copying mistakes, etc.

Moreover, all the rules concerning essays apply.

Short, open answer questions are also called "restricted response tests".**

A set of short, open answer questions preceded by a case history is sometimes called: Modified Essay Questions.***

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*The same problem arises in the use of MCQ with automatic marking, but its frequency does not exceed 0.4%, and is very often less.

**Rezler, A. G. The restricted response test: one alternative to multiple choice and essay tests, in NLN Publ. (15 – 1761), National League for Nursing, New York, 1979.

***Knox, J. D. E. The modified essay question, Dundee Association for the Study of Medical Education, 1976 (Medical Education Booklet No. 5).

EXERCISE

Following some of the principles set out on the preceding page, prepare a written, "open-book"* examination question of the essay type, and three short, open answer questions; indicate the *standard of performance* for each so that marking can be objective, i.e., *a rating scale* comprising *all the information that another person will need to be able to mark in the same way as you.*

Written question of the essay type, including the text of the expected answer.

Scoring instructions: Acceptable level of performance

---

*An "open-book" question means that the candidate may refer to any book, document, handout or personal notes. Such a question is not, therefore, intended to evaluate ability to memorise.

EXERCISE

Now go on to draft some short, open answer questions.

Text of the question	Acceptable answers

Scoring Instructions: Acceptable level of performance

directions for writing multiple-choice questions

1. Make certain that the stem consists of a complete statement, not just a single word.

2. Place all common elements in the stem of the item. This adds simplicity and compactness to the item.

3. Make each item completely independent of answers to other items (for instance, the stem of one should not suggest the answer to another).

4. Eliminate all unrelated details from an item.

5. In general, avoid negative statements, but if a negative expression does appear in the stem of the question, underline it to draw the student's attention to it.

6. Use ***plausible*** or logical ***distractors***. Each distractor should, by its content or nature, be such that it appears to have something to do with the question. Unrelated distractors appear silly to a thoughtful examinee. Since the number of possible answers is thereby cut down, the item loses some of its value.

7. Avoid the use of clues that may suggest the correct answer.

8. Be sure that the distractors and the correct response possess homogeneity, that is, they should be fairly similar in content or in the total number of words.

9. Be cautious of the use of "none of the above" as a distractor or as a correct answer.

10. If it is impossible to obtain more than three plausible responses, do not waste time trying to invent some others.

11. When dealing with items that have numerical answers, arrange the answers in order from large to small or vice-versa.

12. Arrange the place for the correct answer in such a way that, for the test as a whole, no letter corresponding to a given answer appears more frequently than some other letter.

examples of multiple-choice questions

One "best response" type

Question 1

In differentiating cirrhosis of the liver from chronic constrictive pericarditis, a useful physical sign is:

(a) hepatomegaly;
(b) ascites;
(c) distension of the neck veins;
(d) pitting oedema of the ankles and legs;
(e) splenomegaly.

Question 2

Active immunisation is available against all of the following diseases ***except***:

(a) tuberculosis;
(b) smallpox;
(c) poliomyelitis;
(d) malaria
(e) yellow fever.

The multiple-true-false type (also called "multiple-response item").

This type consists of a stem followed by several true or false statements. The candidate is to determine whether or not *each of the four* statements which follows is true or false. He then responds according to a code which permits one out of five possible combinations or responses whereby one, two, three, or all four statements may be true.

- when properly written, the multiple-true-false item type tests the student's knowledge or understanding of several related aspects of a substance, a disease, or a process;
- each of the statements or completions offered as possibilities must be clearly true or false. This is in contrast to the type "a" format in which alternatives which are "partially correct" may be used as distractors;
- this type of item should be written so that no two of the alternatives are mutually exclusively, i.e. the answer "all are correct" ***must be a possible response***.

The directions for this item type are as follows:

For each of the incomplete statements below, ***one*** or ***more*** of the completions is correct. On the answer sheet blacken space under:

(a) if only 1, 2 and 3 are correct;
(b) if only 1 and 3 are correct;
(c) if only 2 and 4 are correct;
(d) if only 4 is correct;
(e) if all are correct.

Question 3

A child suffering from an acute exacerbation of rheumatic fever usually has:

1. an elevated sedimentation rate;
2. a prolonged P – R interval;
3. an elevated antistreptolysin 0 titre;
4. subcutaneous nodules.

The matching type

Directions for constructing matching items[1]

- Limit the number of entries to about 10. If situations arise where 20 or 30 entries must be considered, construct two or three matching items. When long lists have to be matched, the student wastes too much time in trying to find the correct response.
- Do not break items by the bottom of the page. The complete item should be on the same page.
- Have a longer list of questions than of possible answers and state in the directions that these may be used more than once. When there are an equal number of questions and answers, it is possible for the student, after responding to some of them, to complete his task by elimination and guessing.
- Strive for homogeneity.

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[1] Downie, N. M. Fundamentals of Measurement: Techniques and Practices, New York, Oxford University Press, 1967.

The directions given to examinees for this type of item are as follows:

"Each group of questions below consists of lettered headings followed by a list of numbered words or statements. For *each* numbered word or statement, select the *one* heading that is most closely associated with it and blacken the corresponding space on the answer sheet. Each lettered heading may be selected once, more than once, or not at all.

Examples:

Questions 4 to 9

(a) increased metabolic activity;
(b) hyperinsulinism;
(c) lack of storage of glycogen in the liver;
(d) storage of an abnormal glycogen in the liver;
(e) decreased secretion by pituitary or adrenal glands;

4. adenoma of islets of Langerhans;
5. violent exercise;
6. hyperthyroidism;
7. Simond's disease;
8. Von Gierke's disease;
9. epidemic hepatitis;

Questions 10 to 14

(a) sodium bicarbonate;
(b) sodium carboxymethylcellulose;
(c) aluminium hydroxide gel;
(d) none of the above;

10. a gastric antacid which is also used in the therapy of hypoparathyroidism because of its property of reducing the absorption of phosphorus;
11. because it is absorbed, it may cause alkalosis, particularly in infants and elderly patients;
12. a gastric antacid which has the disadvantage of causing "acid-rebound";
13. a gastric antacid which precipitates and inactivates gastric pepsin;
14. a gastric antacid and demulcent which can be converted to liver glycogen.

The comparison type

The "comparison" type permits one to compare and contrast two diseases, signs, symptoms, laboratory findings, etc.

When using this type of item, one must be careful to:

- avoid the trivial;
- avoid selecting as one of the pair something that is rare or unusual. For example, if the item asks about the relation of a certain symptom to disease "x" or "y", and the frequency of the symptom in the two diseases is 90% and less than 1% respectively, then the examinee is in a dilemma. If he follows the principle of the "general rule", he may select answer A ("x" only); but if he is aware that the symptom does occur in the exceptional case of disease "y", then he may select answer C ("both"). Which response is correct?

The instructions for this type of item are as follows:

"Each set of lettered headings below is followed by a list of numbered words or phrases. For each numbered word or phrase, blacken the space on the answer sheet under:

(a) if the item is associated with (a) ***only***;
(b) if the item is associated with (b) ***only***;
(c) if the item is associated with both (a) ***and*** (b);
(d) if the item is associated with neither (a) ***nor*** (b).

Examples:

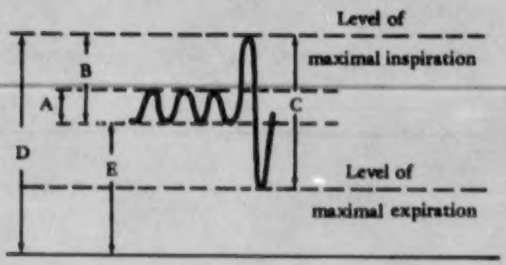
Questions 15 to 17

(a) hookworm disease;
(b) ascariasis;
(c) both;
(d) neither;

15. eosinophilia;
16. hypochromic anaemia;
17. infection through the skin.

Questions with diagrams, photographs, etc.

Questions 18 to 20



18. Total lung capacity

19. Inspiratory capacity

20. Vital capacity

* * *

Test and measurement, or the study of tests used in measurement techniques, is a fairly new science. It was introduced into the world of health sciences teaching about 50 years ago against some opposition, and the problem has certainly aroused the interest of teachers; however, some of them feel that the evaluation "specialists" are trying to poach on their preserves, and that this will limit their academic freedom. This is often due to a lack of information.

Better information would help to disarm the defence mechanisms displayed by teachers when the problem is tackled scientifically, and would thus reduce heated reactions.

* * *

* * *

If no reference is made to questions of the true-false type it is not a chance omission! They are really very bad and should not be used.

* * *

examples of items constructed in accordance with the level of intellectual processes*

Utilisation of clinical tests for application of basic science concepts.

Level 1 – *Recall of facts*

Item 1:

The Fick principle is illustrated mathematically by which of the following formulae:

A $$\frac{A_{O_2} - V_{O_2}}{O_2 \text{ Consumption (ml/min)}}$$

B $$\frac{\text{Cardiac Output (litres/min)}}{\text{Heart Rate (beats/min)}}$$

C $$\frac{\text{Heart Rate (beats/min)}}{\text{Cardiac Output (litres/min)}}$$

D $$\frac{O_2 \text{ Consumption (ml/min)}}{A_{O_2} - V_{O_2}}$$

E $$\frac{\text{Cardiac Output (litres/min)}}{\text{Body Surface Area (sq. metres)}}$$

Level 2 – *Interpretation of specific data*

Item 2:

Apply the Fick principle to the following data and calculate the amount of glucose (in mg/min) extracted by the spleen of a dog:

Cardiac output – 2 litres/min
Stroke volume – 200 ml/min
Cardiac index – 2.8 litres/sq. metre
Arterial glucose – 100 mg/ml
Splenic vein glucose – 96 mg/ml
Splenic blood flow – 50 ml/min

Which of the following corresponds to the result of your calculations?

A 140
B 178
C 200
D 225
E 250

Clinical case (for questions 3, 4 and 5)

A 25 year old male patient comes to your office complaining of cramps in the muscles of his arms or legs whenever he engages in strenuous muscular exercise. This complaint has become more prominent over the past three to four years. The general physical examination is normal. The patient has previously been seen by another doctor who performed a muscle biopsy. When you call the other doctor's office, you learn that the only abnormality noted on the biopsy was excess accumulation of glycogen in the muscle fibres. Electromyography was normal. The blood chemistry determinations related to carbohydrate metabolism which are performed in the hospital where you work are glucose and lactate.

You decide that you want to find out why the patient has muscle cramps and excess glycogen. To obtain further data, you apply the Fick principle to the right leg and insert small polyethylene catheters in the femoral artery and femoral vein at the level of the inguinal ligament. You make a blood flow estimation for the right leg and obtain a value of 200 ml/min at rest. You also take two resting blood samples from the arterial and venous catheters.

You then have your patient pump a bicycle ergometer for five minutes and at the end of exercise you take a series of five arterial and venous samples at two minute intervals. You have glucose and lactate determinations performed on each of the 14 blood samples.

---

*Re-read pages

The results on the resting samples are reported as follows:

	Arterial	Venous
Glucose	75 mg %	73 mg %
Lactate	8 mg %	9 mg %

Item 3:

The glucose and lactate extraction (in mg/min) by the tissues of the right leg in the resting state is:

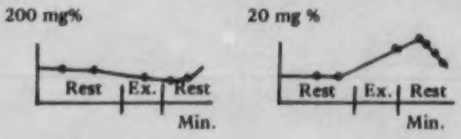
	A	B	C	D	E
Glucose	400	4	100	0.01	40
Lactate	200	2	200	0.005	20

Level 3 – *Solution of a problem*

Item 4:

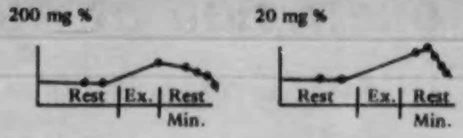
On the basis of your knowledge of muscle carbohydrate metabolism, the history from the patient and the muscle biopsy report, which of the following sets of pre-post exercise data on ***venous blood*** would be most likely in this patient?

A



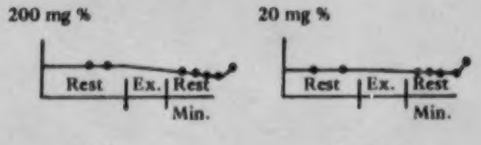
Glucose Lactate

B



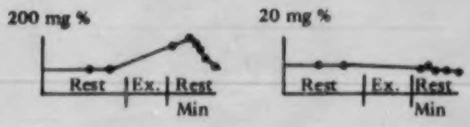
Glucose Lactate

C



Glucose Lactate

D



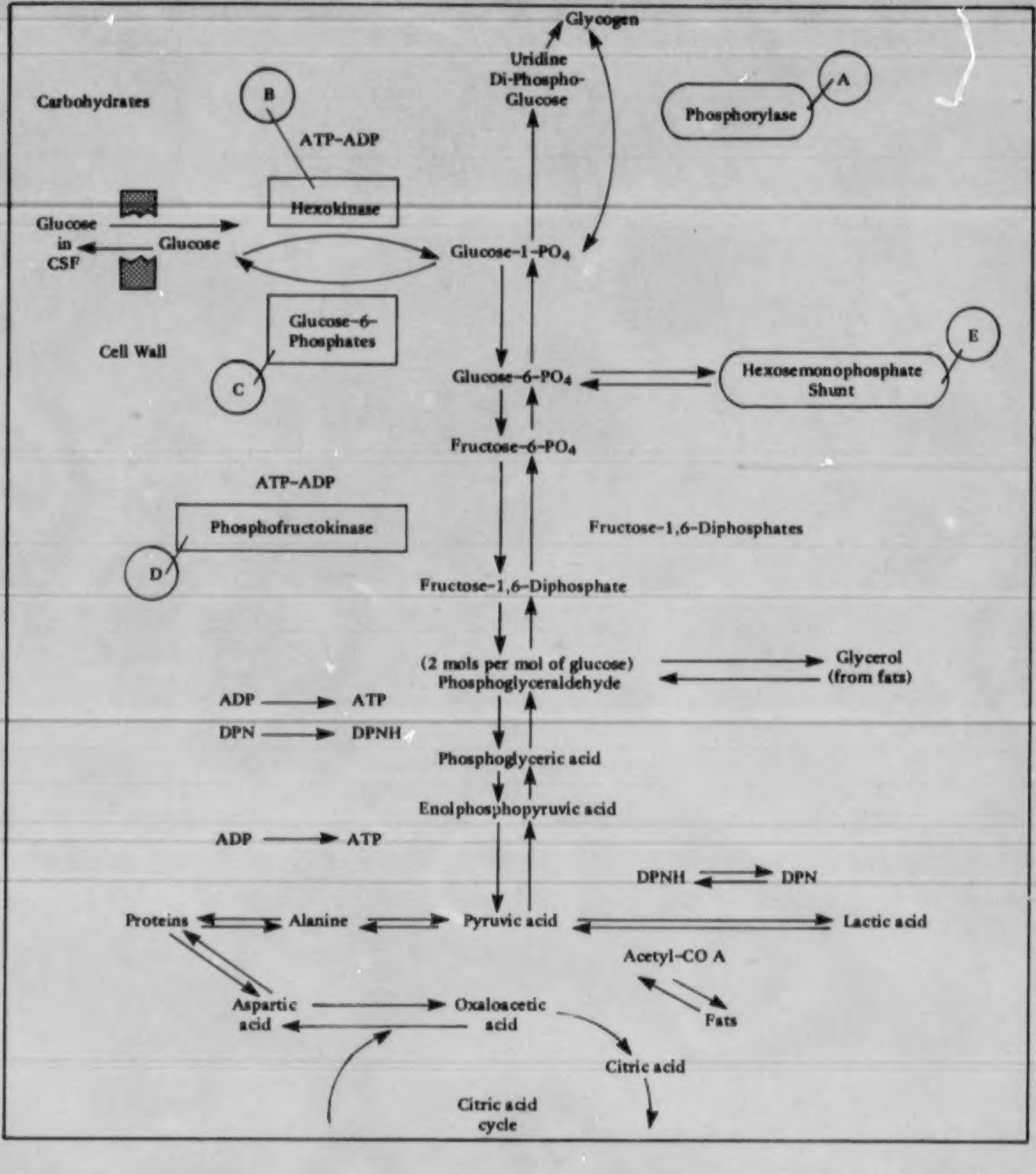
Glucose Lactate

Item 5:

Study the basic principles of carbohydrate metabolism as shown in the figure on page 4.37. Note those parts of the metabolic route indicated by a letter (A, B, C, D and E).

Assuming that one of several reasonable explanations of the symptoms presented by the patient is a metabolic block, and on the basis of the data available to you after study of the preceding parts of the question, select the letter which would be the ***most probable*** site in this route of metabolic block in the patient.

Mark on the answer sheet the letter identifying the point in the route where a more thorough study would have most chance of giving positive results.


Glycogen
Uridine Di-Phospho-Glucose
Carbohydrates
B
ATP-ADP
Hexokinase
A
Phosphorylase
Glucose in CSF
Glucose
Glucose-1-PO4
Cell Wall
Glucose-6-Phosphates
C
Glucose-6-PO4
Hexosemonophosphate Shunt
E
Fructose-6-PO4
ATP-ADP
Phosphofructokinase
D
Fructose-1,6-Diphosphates
Fructose-1,6-Diphosphate
(2 mols per mol of glucose) Phosphoglyceraldehyde
Glycerol (from fats)
ADP → ATP
DPN → DPNH
Phosphoglyceric acid
Enolphosphopyruvic acid
ADP → ATP
DPNH ⇄ DPN
Proteins
Alanine
Pyruvic acid
Lactic acid
Acetyl-CO A
Fats
Aspartic acid
Oxaloacetic acid
Citric acid
Citric acid cycle

Any examination question that has not been tried out on a representative student sample should not be used in a certifying test.

EXERCISE

Compose one or two multiple choice questions of each of the types described above (one best response, multiple true-false, matching, and comparison types). At least half of your questions should measure an intellectual process above level 1, recall of facts (either level 2, interpretation of data, or level 3, problem-solving). Use the objectives that you yourself drew up on pages 1.54 and 1.55.

EXERCISE

You should now be able to reply "yes" to each of the following questions about the items you have just composed. Refer also to the directions given on page 4.31.

In general

1. Is the item realistic and practical?
2. Does it deal with a matter that is professionally useful and important?
3. Is it drawn up using the technical language of the profession?
4. Does it require intellectual skills of a professional kind?
5. Is it independent of every other item in the test?
6. Is it specific?
7. Does it avoid the error of giving away the correct answer by irrelevant details or extraneous data?

The essential problem

8. Is it clear?
9. Is it stated in precise terms?
10. Is it stated briefly and completely?
11. Does it contain only data related to the answer?

The distractors

12. Are they important, *plausible* answers rather than obvious distractors?
13. Do they deal with similar ideas, or data expressed in similar form?

An examination must have regard to practicability

Whether it is practicable will depend on the time necessary for its construction and administration, and the scoring and interpretation of results, as well as on the general ease of its use. Examination methods that lack practicability become a heavy burden on the teacher, who will then tend to give less than due importance to the measuring instrument.

Simulation has the advantage of coming nearer to reality while permitting standardisation and protecting the patient.

the programmed examination[1]

The advantages of this relatively recent method (it appeared at the beginning of the 1960s) are so great that they should help to compensate for the difficulties attaching to its use.

Briefly, its aim is to measure (by simulation on paper) the problem-solving component of clinical competence.

Like the method of multiple choice questions, it is highly objective and can be corrected by computer. Its name shows that this new examination method has certain aspects identical to those of programmed teaching, where the candidate advances, step by step, through a series of consecutive clinical problems.

The method was developed in the United States of America and several types of such simulation tests can be found in the literature. They are sometimes referred to as Patient Management Problems (PMP), Clinical Simulations, etc.

Objectives of the method

The aim of the method is to evaluate clinical competence:

- Ability to detect and satisfactoirly interpret abnormal signs and symptoms.
- Ability then to reach a reasonable diagnosis and to show satisfactory judgement in the choice of treatment.

Until 1963, examiners tried to find an answer to these questions by confronting the candidate with a carefully selected patient. This method was effective in the past, when candidates were not very numerous. More recently, faced with thousands of candidates, thousands of patients and thousands of examiners, test specialists confronted a difficulty which they rapidly recognised. There were three variables: the candidate, the patient and the examiner. This represented two variables too many for a valid evaluation of the candidate.

The first research aim was to seek a valid definition of the qualities involved in what is termed clinical competence (at the level, for example, of a hospital intern). One method employed was that of the questionnaire using Flanagan's "critical incident" technique (see p. 1.09).

Through direct interviews and questionnaires, some 600 physicians were asked to describe clinical situations during which they had personally observed interns in the course of their work and had been impressed on the one hand, by examples of satisfactory clinical conduct, and, on the other by examples of unorthodox clinical conduct. Three thousand situations of this type were analysed. This ample documentation gave an idea of what had to be evaluated.

The following step was to determine how to evaluate this "what". Numerous methods were envisaged.

Silent films, in colour, of carefully selected patients were used instead of actual patients, the examiner being replaced by a series of multiple choice questions concerning the patient presented. This method proved satisfactory and it is now in routine use by examining bodies.

Finally another method was found (programmed testing) for evaluating the abilities of the intern when placed in a clinical situation as real as possible and called upon to face the unforeseeable problems presented by every patient.

In everyday routine the intern may be required, for example, to see a patient who has just been admitted to the medical department. He goes to the patient, gets information from him and makes a clinical examination. He must then take a certain number of decisions. He calls for certain laboratory tests whose results, combined with those of the clinical examination, will lead him to reach a diagnosis and decide on a treatment. The patient's condition may then improve, worsen or remain unchanged by the treatment. The situation changes, new problems appear and fresh decisions must then be taken in the light of these new data.

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[1] Also called "Patient Management Problems".

See also Simulation in instruction and evaluation in medicine in WHO Public Health Paper No. 61, Geneva 1974.

The ***programmed testing*** recreates, as far as possible, the changing situation represented by every patient. Each patient is described in accordance with a real case history. From four to six "clinical problems" are presented following the case study with the aim of simulating a situation changing in time. The patient can be followed up for several days, weeks or possibly months, just as in real life, until he is discharged either cured or with his condition improved or, if he dies, passes to the autopsy table.

At each step in time the candidate is required to make decisions; he immediately learns the results thereof and, with this fresh information, goes on to the following "choice", always concerning the same patient.

The "eraser" technique

The methodology of this type of test, as with programmed teaching, requires that the information given to the candidate is hidden from him until he has made a decision and thus becomes entitled to obtain additional information.

We shall not deal at length with the different technical difficulties that had to be overcome before a satisfactory system was found. As things are at present the appropriate information ***is bidden by a completely opaque layer of ink*** which can be removed, however, with an ordinary pencil eraser, or ***revealed by a system comparable to invisible ink*** (for the formula see page 4.48).

The method can be easily used for examining a large number of candidates simultaneously.

Examples of case histories

A clinical observation, situation or study is described to the candidate and he is then asked:

1. To study the details carefully and then the list of possible decisions presented for each "choice" linked with the initial observation.

2. To choose from the list only the numbered items which seem important and appropriate.

3. To erase the corresponding opaque rectangle on the answer sheet, or to discover the "consequences" by applying a special product.

The candidate is reminded:

1. That except in rare instances, it is not suggested how many of the proposed decisions he should choose.

2. That information (or "consequences") will appear in the space erased for both correct and incorrect choices.

3. That since the information gradually revealed may orientate his subsequent decisions, he should consider them one after another in the order indicated.

4. But that within each "choice", the order of the numbered decisions is proposed at random although it is advisable for the candidate to re-establish a logical order in his choice.

Scoring

The usual manual machine or computer method of scoring is employed, each space erased corresponding to one answer so that the candidate is unable to cancel a mistake once his choice has been made (the same applies in the case of a real patient).

The candidate is penalised whenever he makes an incorrect choice and whenever he fails to make a choice which was appropriate. The scoring is thus negative, taking into account sins of both omission and commission.

The choices proposed to candidates can be divided into three groups:

(a) Appropriate; should be made with the aim of improving the patient's condition (this is indicated by the mark +1);

(b) Not indicated; should not be done and, if it is done, may be dangerous for the patient (mark -1);

(c) Neutral, of debatable importance; may or may not be done according to local conditions, teaching, customs, etc. (mark 0).

The candidate who does not make a choice regarded as suitable by the examiner or who makes a choice regarded as not indicated or dangerous is penalised.

Choice (c) has no effect on the scoring.

Consequently, this is a scoring system completely different from that for multiple choice questions where the candidate must select the best (and only) answer from several suggested.

In programmed testing he must decide to select all those choices he regards as appropriate for the treatment of the patient. He is not told how many choices he must make. The same applies in medical practice, where the physician makes a choice between what should be done and what should not be done. If he is proceeding on the right lines, he makes a certain number of decisions out of all those which could be made.

Experience (immediate feedback after "erasing") gives him fresh data which will guide him towards new decisions.

If he is on the wrong track, experience ("erasing") will show him his errors as they arise and give him a chance of changing his action although he will not be able to cancel out his mistakes.

Improvement of case histories

By means of test and measurement correlation studies the quality of questionnaires can be improved. The teachers who have drawn up the questions learn from the statistical study, question by question, how they can better test discriminatory qualities of judgment enabling a choice to be defined as "appropriate", "non-indicated", or "neutral".

The task is different and considerably more arduous than that involved in drawing up the usual multiple choice questions.

On the other hand, the examiners find themselves on more familiar ground and feel that they are dealing with practical clinical situations in a much more realistic way than when they had to decide on a single best choice.

The method is far from perfect and calls for constant improvement, but gives new hopes for the evaluation of the clinical competence of physicians. It makes possible the evaluation of certain qualities which were not evaluated in the past, qualities considered essential for preparing the physician to assume independent responsibility in the practice of his profession.

example of a programmed test

Specific objective: To deal in order of priority with several patients who come for treatment at the same time.

Level required: To master the objectives 1, 5.1, 5.2 and 5.3 (see pp. 1.29 and 1.30).

Description of the situation:

Coming into the waiting room of a children's outpatient clinic, you find 15 children accompanied by their mothers, as follows:

1. A three-year-old with a scalp affection
2. A six-month-old infant suffering from diarrhoea without outward signs of dehydration
3. A newborn infant, 10 days old, with jaundice
4. A boy, eight years old, feverish
5. A girl, three years old, with hyperthermia and dysphagia
6. A mother carrying her newborn infant under her veil
7. A 15-month-old girl with a cough and fever
8. A two-month-old infant who has suffered from diarrhoea for a week and is obviously dehydrated
9. A six-month-old infant, cyanotic, feverish, and showing signs of dyspnoea.
10. A five-year-old with expiratory bradypenia and wheezing.
11. A boy, 14 years old, with a phlegmon on his hand
12. A six-year-old girl who has suffered from abdominal pains for the last two weeks
13. An infant of seven months coming for a routine check up
14. An eight-year-old, pale but without signs of dyspnoea
15. A boy, seven years old, with arthritis of the right knee

Section A

You now decide to: (you are entitled to only one choice)

Decisions to consider	Consequences	Mark
1. Begin by examining the patients in the order of their arrival	Five minutes after beginning your examinations, the nurse calls you into the waiting room. The condition of one of the children is critical. Select another decision.	-1
2. Have measurements taken of the temperature, weight and height of all the children.	Meanwhile, one of the children suffers a respiratory arrest. Select another decision.	-1
3. Examine some of the children in priority	Select the three children that you should examine first in your consulting room. Go on to Section B and follow up these three children among the 15 on the list.	+1
4. Send children 7, 9 and 10 for X-ray	While on their way, one of them faints. Select another decision.	-1

Section B

Consequences	Mark
1. While you are examining this child, a child dies in the waiting room.	−1
2. You are called into the waiting room where a child is in convulsions.	−1
3. The nurse summons you urgently.	0
4. In the waiting room, a child suffers a respiratory arrest.	−1
5. You are urgently called to the waiting room.	−1
6. Under the mother's veil, you discover a newborn child 10 days old, cyanotic and congested. T: 95°F (35°C). Conjunctiva yellowish. Go on to Section C.	+1
7. You are summoned to the waiting room.	−1
8. W: 4.1 kg, H: 56 cm, CC: 39 cm, T: 96.4°F (35.8°C). Persistent abdominal skinfold; eyeballs sunken; cold hands and feet. Go on to Section D.	+1
9. W: 7.6 kg, H: 64 cm, CC: 44 cm, pulse 180/min, RF: 90/min. foci of crepitant sounds in both lungs. Go on to Section E.	+1
10. While making your auscultation you are summoned urgently.	−1
11. During your examination, the mother of another child bursts into your consulting room with her child who is in convulsions.	−1
12. You are urgently called into the waiting room.	−1
13. You are urgently called into the waiting room.	−1
14. A child is in convulsions in the waiting room.	−1
15. A child has a respiratory arrest in the waiting room.	−1

W: Weight; H: Height; CC: Cranial circumference; T: Temperature;

RF: Respiratory frequency.

Section C

For this child you now decide to:

Decisions to consider	Consequences	Mark
1. Interrogate the mother.	While you are doing this, the dyspnoea becomes more severe and the child becomes more congested.	- 1
2. Make a complete examination of the child.	During the examination, the child becomes cyanotic.	0
3. Request biological tests.	The moment the needle is inserted into the vein, the child has a respiratory arrest.	- 1
4. Immediately treat the symptoms.	Go on to Section F.	+ 1

Section D

For this child, you now decide to:

Decisions to consider	Consequences	Mark
1. Interrogate the mother.	The child has a collapse.	- 1
2. Make a complete examination.	During the examination, the child becomes cyanotic. Pulse 180	0
3. Request a blood count, sedimentation rate, urea and glycaemia	While you are inserting the needle, the child has a respiratory arrest.	- 1
4. Immediately give emergency treatment.	Go on to Section G.	+ 1

Section E

For this child, you now decide to:

Decisions to consider	Consequences	Mark
1. Interrogate the mother.	While you are doing so, the child goes into convulsions.	- 1
2. Make a complete examination.	The child's temperature rises to 106.7°F (41.5°C)	0
3. Perform a lumbar puncture.	While you are doing so, the cyanosis suddenly increases.	- 1
4. Immediately give emergency treatment.	Go on to Section H	+ 1

Treatment	Section F		Section G		Section H	
1. Place the child near a heat source.	Temperature rises to 97.7°F (36.5°)	+1	When done: Temp: 97.1°F (36.2°C)	+1	To warm it up? It already has 106.7°F (41.5°C) Treatment cancelled	-1
2. Decongest	When done, the obstruction becomes less.	+ 1	Child not congested	0	Child not congested	0
3. Empty the stomach	Done	+ 1	Done	+ 1	Done	+1
4. Give oxygen	When done, the cyanosis disappears	+1	Pointless	0	When done, the cyanosis disappears	+1
5. Give a perfusion	Note under Section I the quantity of serum, the serum composition and rate of flow	+1	Note under Section J the quantity of liquid, the nature of the perfusion and the rate of flow	+1	Note under Section K the quantity of liquid, the nature of the perfusion and the rate of flow	+1
6. Give an enema of 200 cc of water at 14°C	To bring down the temperature??? Cancelled by the officer on duty	-1	Treatment unsuitable, cancelled by the resident physician	-1	Note under Section K the quantity and the nature of the liquid injected	+1
7. Aspirin	Prescription cancelled by the officer on duty	-1	Prescription cancelled by the resident physician	-1	Note under Section K the dose and the route of administration	+1
8. Cephalothin	On what basis? Prescription cancelled	-1	Not indicated. Prescription cancelled.	-1	Not indicated. Prescription cancelled.	-1
9. Ampicillin	There is no valid reason to give this child antibiotics	-1	Not indicated. Prescription cancelled.	-1	Not indicated. Prescription cancelled.	-1
11. Ampicillin-gentamycin	You have no valid basis at this stage. Prescription cancelled for the time being.	0	Not indicated. Prescription cancelled	-1	Not indicated. Prescription cancelled.	-1
12. Penicillin	You have no valid basis for giving antibiotics. Prescription cancelled.	-1	Prescription cancelled.	-1	Note under Section K the dose and the route of administration.	+1
13. Chloramphenicol	This antibiotic is not for the newborn. Prescription cancelled.	-1	Prescription cancelled	-1	No indication. Prescription cancelled.	-1
14. Hydrocortisone hemisuccinate	Not indicated. Prescription cancelled.	0	Note the dose under Section J.	+1	Not indicated. Prescription cancelled.	-1

Section I

Section J

Section K

Drawn up by Professor J. -P. Grangaud, Test and Measurement Workshop, Timimoun, Algeria, February 1977.

Note:

Special printing techniques require somewhat sophisticated and often patented apparatus. A *simple* technique developed under WHO sponsorship has been published under the title: ***An invisible ink process for use as an educational tool.*** in ***Information: occasional publication No. 3***, 1981, B.L.A.T. Centre for Health and Medical Education, Tavistock Square, London, WC1H 9JP. It is suitable for reproduction by stencil or offset processes. The invisible ink and the developer can be made from products easily obtainable on the market.

The simplest technique is still that described by Rimoldi* in 1955. The description of the clinical picture is typewritten on an ordinary sheet of paper; the "decisions to consider" are also typewritten, but on cards of 8 x 10 cm, and the "consequences" are on the back of the same cards. When the student has made his choice, he turns over the selected card and, if it is a certifying test, the teacher notes this. The P4 packs from H. Barrows, McMaster University, Canada, are a good example of the technique.

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*Rimoldi, H. J. A. A technique for the study of problem solving. Educational and psychological measurement, 15, 450 – 461, 1955.

EXERCISE

Try to draw up a programmed test. Take as a basis a clinical observation or an epidemiological situation. Show the result to several colleagues and ask them for constructive criticism.

List the advantages and disadvantages of this type of test.

stages of assessment

- prerequisite level testing
- pre-testing
- pre-final feedback comprehensive testing
- "subjective" impression
- final testing
- safety testing
- follow-up testing

different types of examinations during a course and their stages

Prerequisite level test

Before commencing a course it is necessary to ascertain whether the students have reached a certain level, namely the ***prerequisite level*** (refer back to page 1.44). A teacher must specify which knowledge he considers indispensable to ensure that the students assigned to him derive maximum benefit from the instruction he has planned for them. This test shows whether all the students are at this level or whether they are not, in which case coverage of this area must be ensured by modifying the proposed instruction to bring them up to this level. If this is not done the quality of instruction must suffer. Depending on the number of students who need bringing up to this level, the teacher must decide on the type of remedy – either reference to books or additional instruction – for the students concerned, possibly with the assistance of students who have reached the level and can be given the task of "instructor". As far as possible a "repeat" for all the students should be avoided, since this would amount to ignoring the diagnosis obtained by means of the prerequisite level test.

Pre-testing

When a given course commences it is advisable to ***make sure of the level of the students with respect to the course***; on the one hand, this ***measurement of the starting level*** will permit the assessment of the real gain at the end of a course, on the other – and this has been shown experimentally – it may be found that some students are already quite advanced as regards the objectives envisaged for the course and allowance should therefore be made for this. This is a formative test (see pages 2.15 – 2.16).

Interval testing

These tests must be set ***as the course proceeds*** to give the student the feedback he needs in order to know where he stands after a particular period of instruction. The teacher must see that these tests are, as far as possible, of the same difficulty as the final examination. One way of doing this is to select at random at least three "packets" from a group of questions. These three equivalent packets (a_1, a_2, a_3, see diagram on page 4.51) will be used not only for interval testing but also for pre-testing (formative), pre-final feedback comprehensive testing (formative) and final testing (certifying). Thus, when the student reaches the final examination he will not be haunted by the idea of its difficulty; he will have been brought up to the necessary level beforehand.

Pre-final feedback comprehensive testing

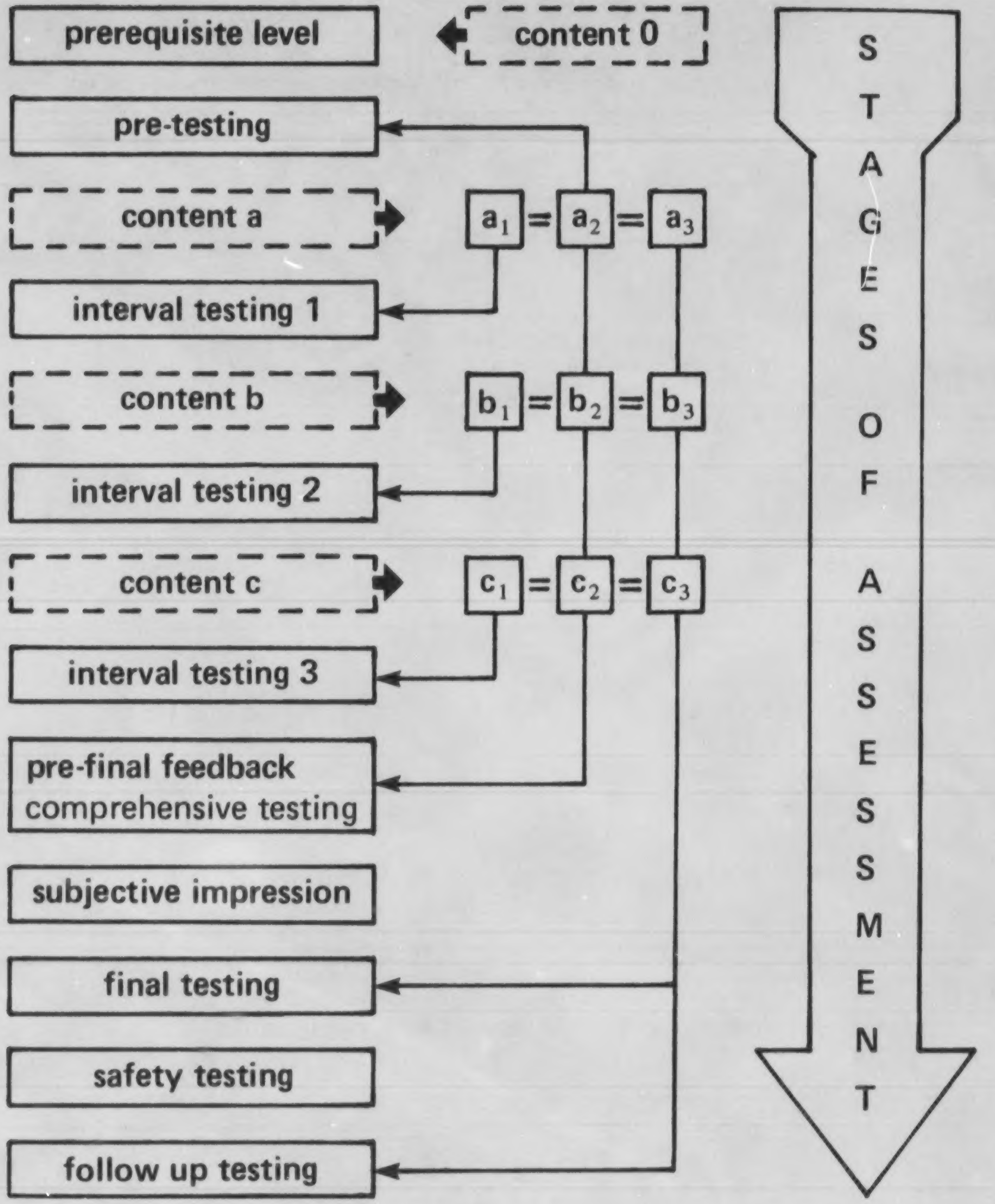
This is a test of the ***formative*** type set ***before the final examination*** (comprehensive) of a course or the year (pre-final). Its purpose is to inform the student about his level of competence (feedback) and it should not be limited to a single subject but should cover a group of subjects. This will be facilitated if the school follows an integrated curriculum. If it does not, the teacher must include questions from other fields directly relevant to understanding of the subject taught.

Subjective impression

Evaluation of this type is carried out on the basis of the teacher's ***personal knowledge*** of the students after contact with them during the year; he seeks to divide the students into three categories: good, average and bad. It would perhaps be preferable to divide them into two groups only: satisfactory and unsatisfactory. This evaluation should be carried out ***before the final examinations*** at the end of the year.

Final testing

These are of different types: oral, practical, traditional written, short open answer, or multiple-choice questions according to the educational objectives to be measured. They are organised ***after the end of a course***.


prerequisite level
content 0
pre-testing
content a
a1 = a2 = a3
interval testing 1
content b
b1 = b2 = b3
interval testing 2
content c
c1 = c2 = c3
interval testing 3
pre-final feedback
comprehensive testing
subjective impression
final testing
safety testing
follow up testing
STAGES OF ASSESSMENT

4.51

Safety testing

This should be carried out if there is an abnormal difference between the "subjective impression" and the results of the final examinations. If a student who was considered satisfactory or good has a bad mark in the final examination, it is essential to re-evaluate the situation and not to give the final examination the role of final and arbitrary sanction which it has so often had in the past.

Follow-up testing

This is a form of evaluation which is carried out ***sometime after completion of the course*** to determine the extent to which the student has retained the acquired level of competence.

> When several measuring instruments give consistent results despite different weaknesses, the reliability of the evaluation is increased.

desirable qualities of rating scales

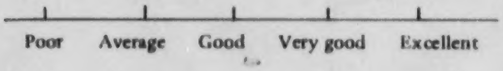
- clarity
- relevance
- precision
- variety
- objectivity
- uniqueness

factors influencing rating[*]

An evaluation made by a human observer is more or less objective and subject to error. The following are the factors influencing rating. The list is not exhaustive!

Errors due to leniency

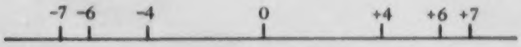
Leniency is a well known factor. One means of counterbalancing this tendency is to use a scale containing only one "unfavourable" appraisal in five, for instance:



In this case the appraisals will probably be distributed symmetrically around "good".

Central tendency

Examiners have a tendency not to give extreme appraisals and hence to group all candidates around the mean. This *central tendency* may be reduced by using a scale that is wider at the centre than at the ends, for example:



The halo effect

One particular feature of a candidate sometimes seems so important to the examiner that it influences the overall evaluation. Thorndike called this the *halo effect*. However, this effect is reduced as the number of separate aspects of the problem dealt with by the evaluation is increased.

The logical error

The *logical error* is similar to the halo effect and occurs when the examiner supposes that there is a relationship between two variables to be evaluated and that "if the first variable is of a particular order, the second will be similar". This error may be reduced if the evaluation relates to an observable element rather than to an abstraction which could lead to semantic confusion.

The contrast error

An observer who is very orderly will tend to consider, *by contrast*, that other people are less orderly than he is, and *vice versa*. On the other hand, people frequently believe that "others are like me" and are very surprised to see that this is not so.

The proximity error

If an observer evaluates two different factors, the evaluation of one factor tends to influence that of the other, and the shorter the interval between the two, the more pronounced the tendency (*proximity error*) will be.

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[*] Guilford, Psychometric methods, pp. 278–280.

test construction specification table

Content areas	Number of test items in relation to type of competence measured by test				
	Recall of facts	Interpretation of data	Problem Solving	n	%
Objective 1	6	3	1	10	20
Objective 2	8	2	0	10	20
Objective 3	12	6	2	20	40
Objective "n"	4	4	2	10	20
No. of items	30	15	5	50	
%	60	30	10		100

EXERCISE

Complete this specification table, making a qualitative analysis of the exercises proposed in this guide: for each exercise, decide which is the level tested – Level 1: Recall of facts; Level 2: Interpretation of data: Level 3: Problem solving; (reread page 1.39). Then calculate the percentage share of each level in the total. Check your results on the next page.

		Competence measured by the test			Number of tests		Percentage
Objective	Description of the exercise (for details, see references page 15)	Recall of Facts	Interpretation of Data	Problem Solving	per exercise	per chapter	
3	Identifying professional activities					Chapter 1	
3	Listing the main functions of a category of health personnel						
20/26	Analysis of the relevance of a programme						
5	Identifying the components of a professional task						
6	Selecting active verbs corresponding to a task						
8	Identifying the elements of a task						
8	Identifying the elements of an educational objective						
6	Drawing up specific educational objectives						
7	Drawing up contributive educational objectives						
8	Critical analysis of an educational objective						
1 to 9	Evaluation of intellectual skills with regard to educational objectives						
17	Specification of educational decisions					Chapter 2	
12	Distinguishing between formative and certifying evaluation						
13,14,16	Choice of evaluation method						

		Competence measured by the test			Number of tests		Percentage
Objective	Description of the exercise	Recall of Facts	Interpretation of Data	Problem Solving	per exercise	per chapter	
15, 16	Comparing different methods of evaluation					Chapter 2	
17	Diagram showing an evaluation system						
18	Description of obstacles and tactics in the implementation of an evaluation system						
10 to 18	Evaluation of intellectual skills with regard to evaluation planning						
19	Description of learning situations					Chapter 3	
28	Description of the teacher's functions						
24	Selection of teaching methods						
24	Comparison between several teaching methods						
29	Construction of an organisational chart for programme implementation						
29	Description of obstacles to and tactics for setting up a new programme						
19 to 29	Evaluation of programme construction skills						
32	Listing advantages and limitations of evaluation by students					Chapter 4	
33	Construction of a practical test or a project						
33	Constructing a rating scale for attitudes						
34	Preparation of a written question						
34	Preparation of short, open answer questions						
35	Composition of multiple choice questions (MCQ)						

		Competence measured by the test			Number of tests		
Objective	Description of the exercise	Recall of Facts	Interpretation of Data	Problem Solving	per exercise	per chapter	Percentage
36	Construction of a programmed examination					Chapter 4	
36	Completion of a specification table for an examination						
39	Calculation of the minimum pass level for MCQ tests						
40	Calculation of the difficulty and discrimination indexes of a question						
30 to 40	Evaluation of test and measurement skills						
Number of questions							
Percentage							

EXERCISE

Check your answers to the exercise on the preceding page

Your percentages should be about equal (within 10%) to those given below. Broadly, you should have found about 20% of the questions/tests at level 1 (recall of facts) and 80% at levels 2 or 3 (above level 1). At least that is what the author of this Handbook believes.

Exercises

For the exercises marked with an asterisk, you will find answer checklists in the Handbook. See page 15 for the page numbers.

		Competence measured by the test			Number of tests		Percentage
Objective	Description of the exercise	Recall of Facts	Interpretation of Data	Problem Solving	per exercise	per chapter	
3	Identifying professional activities	–	1	2	3	Chapter 1	
3	Listing the main functions of a category of health personnel	–	–	1	1		
20 to 26	Analysis of the relevance of a programme	–	1	–	1		
5	Identifying the components of a professional task*	–	19	–	19		
6	Selecting active verbs corresponding to a task	–	1	–	1		
8	Identifying the elements of a task*	–	1	–	1		
8	Identifying the elements of an educational objective*	–	12	–	12		
6	Drawing up specific educational objectives	–	–	3	3		
7	Drawing up contributive educational objectives	–	–	2	2		
8	Critical analysis of an educational objective	–	5	–	5		
1 to 9	Evaluation of intellectual skills with regard to educational objectives*	7	13	–	20	68	31.8
17	Specification of educational decisions	–	–	1	1	Chapter 2	
12	Distinguishing between formative and certifying evaluation*	–	13	–	13		
13,14,16	Choice of evaluation method	–	5	–	5		

Exercises

For the exercises marked with an asterisk, you will find answer checklists in the handbook. See page 15 for the page numbers.

		Competence measured by the test			Number of tests		Percent-age
Objective	Description of the exercise	Recall of Facts	Interpretation of Data	Problem Solving	per exercise	per chapter	
15,16	Comparing different methods of evaluation	–	–	3	3	Chapter 2	
17	Diagram showing an evaluation system*	–	–	1	1		
18	Description of obstacles and tactics in the implementation of an evaluation system	–	–	1	1		
10 to 18	Evaluation of intellectual skills with regard to evaluation planning*	12	–	–	12	36	16.8
19	Description of learning situations	–	–	1	1	Chapter 3	
28	Description of the teacher's functions	–	–	14	14		
24	Selection of teaching methods	–	–	12	12		
29	Construction of an organisational chart for programme implementation*	–	–	1	1		
29	Description of obstacles to and tactics for setting up a new programme	–	–	1	1		
19 to 29	Evaluation of programme construction skills*	8	11	1	20	61	28.5
32	Listing advantages and limitations of evaluation by students	–	–	1	1	Chapter 4	
33	Construction of a practical test or a project	–	–	2	2		
33	Constructing a rating scale for attitudes	–	–	1	1		
34	Preparation of a written question	–	–	1	1		
34	Preparation of short, open answer questions	–	–	6	6		
35	Composition of multiple choice questions (MCQ)	–	5	5	10		

Exercises

For the exercises marked with an asterisk, you will find answer checklists in the handbook.

See page 15 for the page numbers.

		Competence measured by the test			Number of tests		Percentage
Objective	Description of the exercise	Recall of Facts	Interpretation of Data	Problem Solving	per exercise	per chapter	
36	Construction of a programmed examination	–	–	1	1	Chapter 4	
36	Completion of a specification table for an examination*	–	1	–	1		
39	Calculation of the minimum pass level for MCQ tests	–	1	–	1		
40	Calculation of the difficulty and discrimination indexes of a question*	–	5	–	5		
30 to 40	Evaluation of test and measurement skills*	12	8	–	20	49	
Number of questions		39	102	73	214	214	
Percentage		18.2	47.7	34.1			100
		18	82				

relative and absolute criteria tests

These two expressions are also referred to in the literature as *norm-referenced* and *criterion-referenced* tests.

It is very important to distinguish between tests based on reference to the "norm" (i.e. in accordance with the curve for the results of all the students who have taken the same test, and that is why this criterion is termed *relative*), and tests based on reference to a "criterion" (i.e., in relation to the description of an acceptable performance, that is to say, the specific educational objective fixed in advance).

An ***absolute criteria test*** is one deliberately designed to give results that can be directly interpreted in terms of the acceptable level of performance of the person tested. It enables a person's performance to be evaluated in relation to a previously specified level of performance. The aim, therefore, is to determine whether a person has or has not mastered a particular task, and not to compare one person's performance with that of another or of a group of persons. A ***relative criteria test***, on the other hand, aims at enabling a valid discrimination to be made between persons on the basis of different types of performances; it is thus a competitive test.

Relative criteria tests are the ones most frequently employed for examination purposes. Unfortunately their disadvantages greatly outnumber their advantages, for if a group of students is particularly brilliant the utilisation of relative criteria tests will lead to some of them being failed although their level of performance may be satisfactory from the absolute viewpoint. On the other hand, if a given group of students has on the whole a low performance level (because the appropriate instruction has not been given, or has been poorly given, or for some other reason) the relative criteria system may allow "poor" students to pass if they are above the average of their group. The consequences may be extremely harmful for the health of the population.

If, on the other hand, a situation arises in which a certain number of persons have to be selected for admission to a given course of study, it becomes necessary to compare their performances. In that case a relative criteria test is appropriate.

If it is felt unanimously by an evaluation committee, for example, that all the students should be able to master an emergency procedure, then this can be ascertained only by an ***absolute criteria*** test. These tests are, indeed, the only ones that justify the certifying of any health worker as having demonstrated an acceptable level of performance.

It is thus theoretically possible, and even desirable, that ***all*** the students taking an absolute criteria test should "pass". That would demonstrate the high degree of effectiveness of the training programme. It would also, of course, be theoretically possible for all the students to fail.

On the other hand, a relative criteria test is, by its nature, one which will ***always*** divide the students taking it into at least two categories, those who succeed and those who do not, without any guarantee that the former are also competent.

□ □

It basically comes down to a choice between a measurement strategy which compares people versus one that lets us know what it is that people can or cannot do.

(J. Popham)

□ □

□ □

A measuring technique adapted to absolute criteria tests is suggested on pages 4.62 – 4.63, namely calculation of the acceptable level of performance or minimum pass level. You will find on pages 4.65 – 4.70 the measuring techniques suitable for ***relative*** criteria tests (difficulty and discrimination indexes).

□ □

calculation of the acceptable level of performance (ALP) for a MCQ test

1. Definition

The acceptable level of performance is a ***threshold*** value making it possible to decide (according to ***absolute criteria***) whether a student "who knows barely enough" should be ***passed*** or ***failed***.

Calculation of the ALP for a test is not valid unless the number of MCQ is more than 30.

Use of the ALP involves an ***advance*** judgment (before the test) on the relative difficulty of each question and enables a judgment based on the test as a whole to be made.

Calculation of the ALP depends on the collective decision of several teachers each of whom has first made an independent judgment.

2. Procedure*

To calculate the acceptable level of performance (ALP) of a student for a MCQ test:

2.1 the evaluation board decides what is the correct answer to each MCQ;

2.2 the board decides which answer or answers must definitely be eliminated by the student, other than by chance;

2.3 the board calculates the ***acceptability index*** for each MCQ;

2.4 the ALP for the test as a whole is the sum of the acceptability indexes for each MCQ.

The ***acceptability index*** for a MCQ is calculated as follows:

Carefully study all the choices offered (distractors) and decide which the student "who knows barely enough to pass" should be able to reject. For example, if a question offers five choices (only one of which is the correct answer) and it is deemed that the student "who knows barely enough to pass" should be able to reject one of these choices straightaway, it follows that the marginal student could obtain the correct answer by mere chance approximately one time out of four. In this case the acceptability index of the question is 0.25.

For a MCQ	with five choices	with four choices
– if all the distractors are equivalent, the index =	1/5 = 0.20	1/4 = 0.25
– if one distractor must be eliminated, the index =	1/4 = 0.25	1/3 = 0.33
– if two distractors must be eliminated, the index =	1/3 = 0.33	1/2 = 0.50
– if three distractors must be eliminated, the index =	1/2 = 0.50	1/1 = 1.00
– if four distractors must be eliminated, the index =	1/1 = 1.00	

Let us take two MCQ which are worded identically but where the choice of answers is different.

Question:

Which of the following values corresponds to the number of red cells per mm^3 of blood in a healthy adult?

	1		2
A	500 000	A	4 000 000
B	1 000 000	B	4 500 000
C	2 000 000	C	4 750 000
D	3 000 000	D	5 000 000
E	5 000 000	E	5 250 000

In case 1, an acceptability index of 1.00 could be considered while in case 2 it could be 0.25.

---

*This procedure was developed from an article by L. Nedelsky (Absolute grading standards for objective tests. *Educ. Psycholog. Meas.*, 14, 3–19, 1954).

3. Comments

The ALP has little value if it is not based on a detailed analysis of each of the questions in a test, including consideration of incorrect choices just as much as of correct answers.

The validity of the estimate of the ALP also depends on obtaining *independent* judgments from several teachers who have paid attention to the educational objectives and the level for which the examination is intended. The usefulness of the estimate will be the greater the larger the number of teachers involved.

When the differences between the judgements obtained are relatively small, the extremes can serve to define a "grey zone" below which the results will be regarded as distinctly inadequate (failure) and above which the results will clearly indicate a success. For example, if the *mean* of the estimates of one teacher for the ALP of a test is 43% whereas two other teachers obtain figures of 45% and 47%, respectively, then it could be recommended that any score below 43% should be regarded as a failure, that any score above 47% be regarded as a success, while a score between 43% and 47% should be regarded as being in a grey zone. It would remain to be defined what should be done in the latter case.

If the differences between the judgments obtained by several teachers are large then the criteria of the educational objectives should be revised.

EXERCISE

Now . . . . . calculate the acceptable pass level for all the MCQ you drew up on page 4.39.

significance and form of communication of the results of a test as a whole

	Relative Criteria Tests	Absolute Criteria Tests
Base	distribution of scores	educational objectives
Pass Score	*a posteriori*	*a priori*
Form of Results	alphabetical or numerical scoring	– alphabetical or numerical scoring – descriptive profile of student

* * *

If we have objectives that are important to achieve, that is, if there is a genuine need for them to be achieved because a meaningful consequence would result in achievement or non-achievement, then it is also important that we find out if that achievement was accomplished. We cannot do so by comparing one student with another, we can only do so by comparing the performance of each student with the performance called for by the objective.

Mager

* * *

steps in item analysis (relative criteria tests)

1. award of a **score** to each student

2. **ranking** in order of merit

3. identification of **groups**: high and low

4. calculation of the **difficulty index** of a question

5. calculation of the **discrimination index** of a question

6. critical **evaluation** of each question enabling a given question to be retained, revised or rejected

1. Award of a score to each student

A practical, simple and rapid method is to perforate on *your* answer sheet the boxes corresponding to the correct answer. By placing the perforated sheet on the student's answer sheet the raw score (number of correct answers) can be found almost automatically.

	A	B	C	D	E
1.	☐	☐	☒	☐	☐
2.	☐	☐	☐	☐	☒
3.	☐	☐	☒	☐	☐
4.	☐	☐	☐	☒	☐
5.	☐	☒	☐	☐	☐
6.	☐	☐	☒	☐	☐
7.	☒	☐	☐	☐	☐
8.	☐	☐	☐	☒	☐
9.	☒	☐	☐	☐	☐
10.	☐	☒	☐	☐	☐

	A	B	C	D	E
11.	☒	☐	☐	☐	☐
12.	☐	☐	☒	☐	☐
13.	☐	☐	☒	☐	☐
14.	☒	☐	☐	☐	☐
15.	☐	☐	☐	☒	☐
16.	☒	☐	☐	☐	☐
17.	☐	☒	☐	☐	☐
18.	☒	☐	☐	☐	☐
19.	☐	☐	☒	☐	☐
20.	☐	☒	☐	☐	☐

2. Ranking in order of merit

Assuming that the scores of 21 students have been obtained (alphabetical list on the left), this step consists merely in ranking (listing) students in order of merit (in relation to the score) proceeding from the highest to the lowest score. Let us assume the list as under A and then rank the students to obtain distribution B, ranging from 4 to 27.

Student	Score
Albert	7
Alfred	13
Andrew	19
Ann	25
Brian	27
Christine	19
Elizabeth	17
Emily	24
Felicity	16
Frances	14
Frank	26
Fred	17
Harriet	11
Ian	17
John	14
Jennifer	21
Margaret	16
Michael	9
Paul	16
Peter	4
Philip	16

Order	Student	Score
1	Brian	27
2	Frank	26
3	Ann	25
4	Emily	24
5	Jennifer	21
6	Christine	19
7	Andrew	19
8	Elizabeth	17
9	Ian	17
10	Fred	17
11	Felicity	16
12	Margaret	16
13	Paul	16
14	Philip	16
15	Frances	14
16	John	14
17	Alfred	13
18	Harriet	11
19	Michael	9
20	Albert	7
21	Peter	4

3. Identification of high and low groups

Ebel[1] suggests the formation of "high" and "low" groups comprising only the first 27% (high group) and the last 27% (low group) of all the students ranked in order of merit.

Why 27%? Because 27% gives the best compromise between two desirable but contradictory aims:

1. making both groups as large as possible;
2. making the two groups as different as possible.

Truman Kelley showed in 1939 that when each group consists of 27% of the total it can be said with the highest degree of certainty that those in the high group are really superior (with respect to the quality measured by the test) to those in the low group. If a figure of 10% were taken, the difference between the two means of the competence of the two groups would be greater but the groups would be much smaller and there would be less certainty regarding their mean level of performance.

Similarly, if a figure of 50% was taken the two groups would be of maximum size but since the basis of our ranking is not absolutely accurate, certain students in the high group would really belong to the low group, and *vice versa*.

While the choice of 27% is the best, it is, however, not really preferable to 25% or 33%; and if it is preferred to work with $\frac{1}{4}$ or $\frac{1}{3}$ rather than with the somewhat odd figure of 27% there is no great disadvantage in so doing.

For the rest of our analysis we shall use 33%.

4. Calculation of the difficulty index of a question

Difficulty index

Index for measuring the easiness or difficulty of a test question. It is the percentage (%) of students who have correctly answered a test question; it would be more logical to call it the easiness index. It can vary from 0 to 100%.

Calculation

The following formula is used:

$$\text{Difficulty index} = \frac{H + L}{N} \times 100$$

where H = number of correct answers in the high group

L = number of correct answers in the low group

N = total number of students in both groups

(Do exercise on page 4.71).

5. Calculation of the discrimination index of a question

Discrimination index

An indicator showing how significantly a question discriminates between "high" and "low" students. It varies from −1 to +1.

Calculation

The following formula is used:

$$\text{Discrimination index} = 2 \times \frac{(H - L)}{N}$$

(Do exercise on page 4.71).

---

[1] Ebel, R. L. (1965) Measuring educational achievement, Prentice Hall, pp. 348 – 349.

6. Critical evaluation of a question

This is based on the indexes obtained.

Difficulty index: the ***higher*** this index the ***easier*** the question; it is thus an illogical term. It is sometimes called "easiness index", but in the American literature it is always called "difficulty index".

In principle, a question with a difficulty index lying between 30% and 70%* is acceptable (in that range, the discrimination index is more likely to be high).

If for a test you use a group of questions with indexes in the range 30% – 70%, then the mean index will be around 50%. It has been shown that a test with a difficulty index in the range of 50% – 60% is very likely to be reliable as regards its internal consistency or homogeneity.

Discrimination index: the ***higher*** the index the more a question will distinguish (for a given group of students) between "high" and "low" students. When a test is composed of questions with high discrimination indexes, it ensures a ranking that clearly discriminates between the students according to their level of performance, i.e., it gives no advantage to the low group over the high group. In other words, it helps you to ***find out who are the best students.***

It is most useful in preparing your question bank. Using the index**, you can judge questions as follows:

0.35 and over	:	Excellent question
0.25 to 0.34	:	Good question
0.15 to 0.24	:	Marginal question – revise
under 0.15	:	Poor question – most likely discard

---

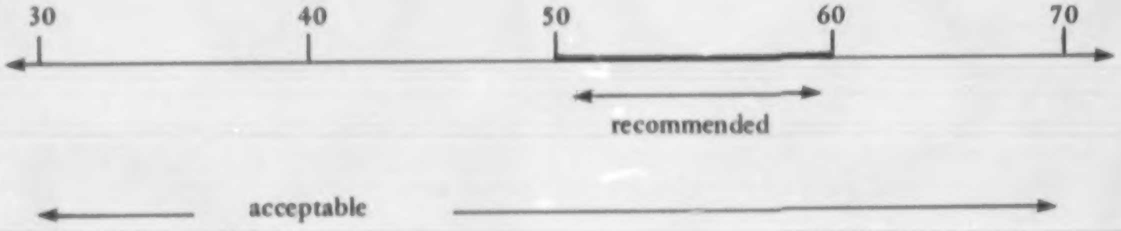
*Some authors give values between 35% and 85%.

** Remember that the index has an indicative rather than an absolute value.

uses of indices
aim: review of questions

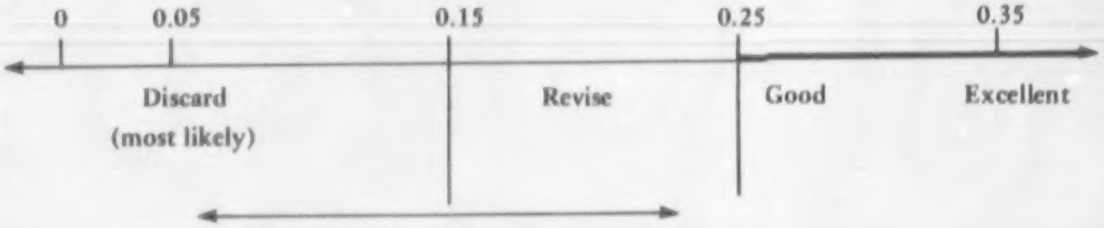
Difficulty Index

$$\text{diff. ind.} = \frac{H + L}{N} \times 100$$


30
40
50
60
70
recommended
acceptable

Discrimination Index

$$\text{dis. ind.} = \frac{2\,(H - L)}{N}$$


0
0.05
0.15
0.25
0.35
Discard
(most likely)
Revise
Good
Excellent

EXERCISE

Given a group of 21 students (see page 4.67). Using 33% of them to constitute a high group of 7 and a low group of 7 (33% of 21), the following table shows the answers given by those two groups (high and low) to 10 multiple choice questions (numbered from 1 to 10 in the first column). The correct answer for each of those ten questions is given correspondingly in the second column. In the 14 consecutive columns are shown the answers given by each student to each question.

Question No.	Correct Answer	Ranking in order of merit														H	L	H + L	H - L	DIF. IND.	DIS. IND.
		Brian	Frank	Ann	Emily	Jennifer	Christine	Andrew	Frances	John	Alfred	Harriet	Michael	Albert	Peter						
1	B	B	B	B	B	B	B	B	B	B	B	B	E	E	E	7	4	11	3		
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	7	7	14	0		
3	A	B	A	B	A	B	B	A	B	B	A	B	A	A	A	3	4	7	-1		
4	E	E	E	E	C	E	E	C	E	C	C	A	E	-	C	5	2	7	3		
5	B	B	C	B	B	C	E	C	C	C	E	E	E	E	E	3	0	3	3		
6	D	D	D	D	C	D	D	D	E	D	E	E	D	E	E					57	0.57
7	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C					0	0
8	C	B	B	B	C	B	C	B	B	B	B	B	B	C	C					28	0
9	E	E	E	E	E	E	E	E	C	E	E	E	C	B	A					71	0.57
10	C	C	C	C	C	C	A	C	C	B	-	C	D	B	A					57	0.62
33%									33%												
High group									Low group												

Now try to:

1. Calculate H - L for questions 6 to 10.
2. Calculate the *difficulty index* and the *discrimination index* for questions 1 to 5.

Check your results on the next page.

Check your answers

Question No.	Correct Answers	Ranking in order of merit														H	L	H + L	H - L	DIF. IND.	DIS. IND.
		Brian	Frank	Ann	Emily	Jennifer	Christine	Andrew	Frances	John	Alfred	Harriet	Michael	Albert	Peter						
1	B	B	B	B	B	B	B	B	B	B	B	B	E	E	E	7	4	11	3	78	0.42
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	7	7	14	0	100	0
3	A	B	A	B	A	B	B	A	B	B	A	B	A	A	A	3	4	7	-1	50	-0.14
4	E	E	E	E	C	E	E	C	E	C	C	A	E	-	C	5	2	7	3	50	0.43
5	B	B	C	B	B	C	E	C	C	C	E	E	E	E	E	3	0	3	3	21	0.42
6	D	D	D	D	C	D	D	D	E	D	E	E	D	E	E	6	2	8	4	57	0.57
7	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0
8	C	B	B	B	C	B	C	B	B	B	B	B	B	C	C	2	2	4	0	28	0
9	E	E	E	E	E	E	E	E	C	E	E	E	C	B	A	7	3	10	4	71	0.57
10	C	C	C	C	C	C	A	C	C	B	-	C	D	B	A	6	2	8	4	57	0.62
		33%							33%												

Conditions for the application of this procedure for item analyses, in particular:

1. it applies to *relative* criteria tests (the procedure leads to a choice of questions that tend to maximise variance and ensure discriminatory ranking),
2. it is applicable only to questions scored dichotomously (1;0),
3. it should not be applied if the total number of students is very small (a minimum of 20 students could be proposed as a "pragmatic" criterion).

Question analysis card

To facilitate the construction of a ***question bank*** it is advisable to enter the statistical results for each question on a separate card. These cards as a whole will constitute the "bank".

The front and the back of the card of this type could be as follows.

Front

Course	Date	Nature of test	Group	Size of group	Chosen answers						Difficulty index	Discrimination index	Comments
					A	B	C	D	E	Blank			
2nd year	6.72	MCQ	High	60	55	2	3	0	0	0	60	0.63	
			Low	60	17	5	3	7	28	0			
Clin. Med	6.72	MCQ	High	10	7	0	2	0	0	1	57	0.30	
			Low	10	4	0	1	1	4	0			
2nd year	6.73	MCQ	High	62	56	2	3	1	0	0	60	0.61	
			Low	62	18	8	3	8	24	1			
2nd year	6.74	MCQ	High	70	60	0	2	3	5	0	59	0.57	
			Low	70	20	7	4	2	30	6			
Speciality Board	7.74	MCQ	High	20	18	0	2	0	0	0	80	0.20	
			Low	20	14	0	0	1	5	0			

Back

Subject	Endocrine System	Nature of question: MCQ
Objective tested	Ability to explain the physiological functioning of the thyroid gland	
Domain	Intellectual skills – Level 1 (recall of facts)	
Question	Which of the following produces an increased secretion of thyroid hormone in a normal subject?	
Answers	A. Administration of TSH B. Administration of thiocyanate C. Administration of propylthiouracil D. Administration of thyroxine E. Some other treatment	
Reference	Sternberg, Chapter 2, page 112 – prepared by Mr. X in February 1972	

EXERCISE

Check your results on page 4.82.

Question 1

The administration of a test before the beginning of a learning period (formative pre-testing) has the following advantages *except one*:

A. To modify educational objectives of that period.

B. To provide ways for less well prepared students to catch up.

C. To modify the required pass level (mark).

D. To provide a base from which to measure real progress.

E. To exclude weak students from the learning period.

Question 2

All the following stages, *except one*, are recommended for scoring tests of the "essay" type:

A. Write the elements of the answer for each of the questions asked.

B. Correct the answers question by question rather than student by student.

C. Determine the pass score on the basis of a sample of answers.

D. Correct the answers while preserving the anonymity of the students.

E. Identify three levels only: honour, pass, fail.

Question 3

The *content validity* of a written test is *usually* obtained by means of:

A. Collective and careful review of the questions.

B. Pearson's correlation coefficient.

C. Factor analysis.

D. An "inter-rater" reliability coefficient.

E. A mean discrimination index.

Questions 4 to 6

A test with 50 questions is administered to a group of 45 students. There is a choice of five answers to every question. Only one of these choices is the correct answer. One point per correct answer is allocated in calculating the total score.

Question 4

Assuming that none of the students have any knowledge of the test subject (i.e. they choose their answers by guessing), which of the following will be closest to the mean score of the group?

A. 0

B. 5

C. 10

D. 15

E. 25

Question 5

On dividing this group of 45 students into 3 groups of 15 each, on the basis of the total score of each student, it is found that, for the first question, nine students out of 15 in the high group and three out of 15 in the low group have given the right answer. For this question the *difficulty index* is:

A. 12%

B. 27%

C. 30%

D. 40%

E. 60%

Question 6

Under the same conditions, the *discrimination index* is:

A. 0.12

B. 0.27

C. 0.30

D. 0.40

E. 0.60

Question 7

On the basis of these indexes, which of the following decisions would you take concerning this question?

A. It should be discarded from the question bank.

B. It should be referred to a drafting committee for revision.

C. It should be retained in the bank as it is.

D. A decision other than A, B or C.

Questions 8 and 9

The following data concern a multiple choice question set to 300 students, the correct answer being D.

	Choice of answers					
	A	B	C	D	E	No answer
High group (100)	22	1	10	67	0	0
Low group (100)	46	5	16	33	0	0

Question 8

These data show that:

A. half the students answered the question correctly;

B. all the distractors were of good quality;

C. the question was of high validity;

D. the question was not very relevant.

Question 9

In view of these data, the examination board may decide:

A. that this question should be reviewed since it is insufficiently discriminatory;

B. that this question should be discarded from the question bank;

C. that this question is of low validity;

D. none of the above.

4.77

Question 10

What could *generally* be expected on doubling the length of a test whose mean discrimination index is 0.52 (by adding questions more or less equivalent to the previous ones)?

A. A certain increase in the reliability and the validity of the test.

B. Only a certain increase in the reliability of the test.

C. Only a certain increase in the validity of the test.

D. A certain decrease in the reliability and validity of the test.

E. No effect on either the reliability or the validity of the test.

Questions 11 to 16

Use the following key in answering this series of six matching type questions:

A = traditional oral test
B = written test of the essay type
C = so-called written "objective" test (MCQ)
D = standardised practical test, or written and oral simulation tests (programmed examination)

Indicate the type of test *most suitable* for evaluating each of the following performances:

Question 11

Recall of concepts.

Question 12

Ability to solve problems.

Question 13

Ability to communicate satisfactorily with the patient.

Question 14

Verbal expression.

Question 15

Skill in examining the patient.

Question 16

Ability to make a synthesis.

Question 17

The system of "relative" criteria of competence implies the following consequences, *except one*. Which?

A. Leads to an embarrassing disagreement among those responsible for applying the resultant decisions.

B. Leads to the failure of certain students in a particularly competent group.

C. Enables one group to become the arbiter of the standards according to which it is judged.

D. Enables "low group" students, who are however superior to the mean of the whole group to which they belong, to pass.

E. Creates an arbitrary fluctuation in the desirable level of competence at a given moment.

Questions 18 and 19

The author of the following multiple choice question was asked to establish its acceptability index.

> The diameter of a normal erythrocyte (according to Wintrobe) expressed in μm (microns) is equal to:
>
> A. 4.5 C. 7.5 D. 8.5
> B. 6.5 E. 10.5

He felt that a student who "knew just enough to pass" should be able to reject right away choices A and E.

Question 18

Indicate which among the following values of the acceptability index corresponds to the author's choice:

A. 0.10 C. 0.25 D. 0.33
B. 0.20 E. 0.50

Question 19

If the item C was not included, what then would be the acceptability index?

Question 20

According to the theories about absolute or relative criteria tests, all the following statements are correct *except one*. Indicate which is false:

A. The calculation of the discrimination index provides a statistical datum applicable to absolute criteria tests.

B. The calculation of the acceptable level of performance (ALP) of a test is applicable to criterion-referenced tests.

C. The acceptable level of performance (ALP) of a test is equal to the sum of the acceptability indexes of each question.

D. The value of the difficulty index influences the value of the discrimination index.

Performance assessments designed to measure competence for a job or task are inescapably imperfect because of measurement errors, and because task components can never represent the total job.

If you find this Handbook too complicated you may wish to refer to another publication of the World Health Organization: *Teaching for better learning: A guide for teachers of primary health care staff* by F. R. Abbat, WHO, Geneva, 1980.

please

..... if you know how to define specific objectives

..... if your colleagues turn green with envy on reading your criteria

..... if you are able to choose the most suitable teaching technique

..... if you can put it into practice

..... if you are a leader

..... if your students admire you

..... if your examinations are valid

..... if your scores are objective

do not be influenced by all this . . !

. . . and over-estimate the importance of your own subject.

do not forget relevance . . !

..... the relationship between your teaching and the institutional objectives derived from community health needs.

4.81

Answers suggested for the exercise on pages 4.75 – 4.80.

Question	Suggested answer	If you did not find the correct answer, consult the following pages again
1	E	2.15 and 2.16, 4.49 – 4.52
2	C	4.28
3	A	2.33
4	C	simple "rule of 3"
5	D	4.65 – 4.72
6	D	
7	C	
8	A	
9	D	
10	A	2.36 and 2.37
11	C	2.22, 2.30 and 2.31, 4.22 – 4.40
12	D	
13	D	
14	A	
15	D	
16	B	
17	A	4.61 and 4.62
18	D	4.62 and 4.63
19	E	
20	A	4.61 – 4.63

workshop 5

how to organise an educational workshop

The purpose of this chapter is to facilitate the task of anyone who wishes to prepare and run an educational workshop.

It contains the basic documents (or refers to the documents) required to organize a *very short workshop (lasting 3 to 4 days), known as a mini-workshop*.

The chapter obviously makes no claim to qualify the reader to organize all possible types of educational workshop regardless of the educational philosophy involved. The type of workshop proposed is designed to use the *WHO Educational Handbook* as its source of theory.

Nevertheless, most of the general principles involved are also valid for longer workshops.

This chapter responds to a need often expressed by those attending workshops run by WHO: the wish to pass on knowledge of the *systematic approach to educational problems* to their colleagues by means of a short meeting.

The method proposed itself uses the *systematic approach*. It also stresses educational principles such as the following:

allowing the participant to prepare and *select the objectives* to be reached will increase his motivation;

giving the participant an active role will make teaching more effective;

providing the participant with regular opportunities to see the progress he is making will increase his learning speed and improve the quality of the knowledge and skills he acquires.

Attention!

This chapter has been prepared for teachers who have attended at least one educational workshop and thus know how such meetings operate and are familiar with the Educational Handbook

This chapter is designed for use in a wide range of local contexts. This means that any user should always remember to make allowance for the cultural, educational and occupational background of participants. Modifications may therefore be contemplated, worked out, put into effect and, most important, evaluated. However, a user with no special training in educational science is not advised to introduce significant changes right away. It is better to use the proposed system as it stands and be prepared to amend it in the light of experience (particularly as a result of "feedback" from participants).

what the term workshop implies

A workshop is a meeting during which experienced people in responsible positions come together with experts and consultants to find solutions to problems that have cropped up in the course of their work and that they have had difficulty in dealing with on their own. Participants themselves select the objectives they wish to reach and help in choosing the problems for group work.*

An essential feature of the workshop is complete active involvement by each participant: the whole point of attendance is to work and to learn from practical experience.

One of the commonest methods used in workshops is group discussion of selected problems, the size of the group being small enough to encourage full participation by each member and large enough for each member to gain from the experience of the others. There is nothing magical about a small group but it does offer each member an opportunity to make his own contribution. It gives participants the chance to discuss and solve the problems of greatest interest to them. The fact that each member can find something in the experience of others that has a bearing on the questions of most interest to himself will make his work more meaningful.

The workshop method makes everyone (organizers and participants) responsible for helping to find solutions to the problems selected. Participants may have to act as group leaders or rapporteurs. The organizers are generally there to be consulted by participants and to help them where necessary (***not*** to give lectures or impose solutions).

The workshop programme makes provision for plenary sessions, discussions in small groups and other activities but does not follow a strict hour-by-hour timetable. On the contrary, the programme adapts itself to the way the work is going. For example, a plenary session will be held whenever there is a need to pool the results of group discussion, to clarify a point for all participants or to introduce some activity that requires unanimous approval.

A *mini-workshop* is a short workshop (lasting three or four days in the case described in this document).

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*These problems and objectives are occasionally selected (in most cases by correspondence) before the workshop begins, to allow the participants time to prepare for it. However, this does not apply to a *mini*-workshop.

aims of an educational mini-workshop

The workshop aims at ***introducing*** participants to a systematic approach to educational problems. They must, so to speak, not only be made "hungry for more" (i.e. anxious to carry on learning about the subject and increasing their skills) but also be given "food for the journey" (documentation containing enough references to enable them to make progress after the workshop is over).

The workshop aims at stimulating a given proportion of participants to wish to reach ***at least*** the objectives set out in the Educational Handbook (see pp. 12 and 13) in the course of the ensuing year.

It has been found from experience that some participants may go far beyond these aims and embark on activities such as:

- defining X% of the specific objectives for the subject they teach;
- replacing X% of traditional lecturing by a more suitable method;
- starting a bank of examination questions that meet the criteria of objectivity, validity, etc. (X questions);
- calculating the discrimination index or acceptable level of performance for X% of the examination questions;

etc.

how to plan a mini-workshop

You have already had first-hand experience, as a participant, of an educational workshop and you have decided to organize and run a mini-workshop yourself in order to let your colleagues know about the systematic approach to educational problems. This will involve a great deal of work. The following *checklist* has been drawn up to help you.

Only those items considered *essential* appear on this list. Not all of them may be applicable in your case and you may also find that some items you need are missing.

Unless you start work *at least* six months beforehand you will be increasing your chances of failure.

The greater the flexibility and adaptability of equipment and staff the greater the chances of success.

One of the aims of the workshop is to meet the needs of the participants. Your apologies will be no use to them if something goes wrong. On the other hand, they will be favourably impressed if, when something unforeseen does happen, corrective measures are taken to keep the workshop running smoothly.

No matter what you do the unexpected will always happen!

It is a tragedy that as soon as normally responsible adults come into contact with education they expect to be told what to do and what to learn . . . Teachers play along with this and find it much easier to meet these expectations than to create the conditions in which students will take responsibility for their own learning.

B J Ed. Tech. Jan. 76 N. Farnes

The success of a workshop will depend largely on the way it is planned and on the arrangements made *before* the opening session.

action checklist

No. of days			Action to be taken	planned date	actual date
	days	see page			
BEFORE	– 365 to –108		– Decision to organize a mini-workshop – Open a file – Define the general objectives and aims of the workshop – Find a source of funds – Have a draft budget approved – Set the dates for the workshop – Choose the place to hold the workshop – Book a meeting room and accommodation for the participants – Define the criteria for selecting participants – Appoint a Committee of Sponsors – Choose the assistant organizers – Take account of the working language		
	– 120		– Start the procedure for inviting participants, informing them of the aims of the workshop and sending them doc. 1 (Working methods) and doc. 2 (Theme of the workshop)		
	– 60 – 45 – 30		– Select the participants from those applying – Inform participants that they have been selected, and send them the documentation (Educational Handbook) – Arrange for document reproduction equipment to be available – Prepare a checklist of the equipment required – Inform the press		
	–8 –2 –1		– Review the list of participants – Arrange the room and inspect the premises (with equipment checklist) – Call a meeting of the assistant organizers and review the programme for the workshop – Have a friendly drink		
DURING	0		Background organization of the workshop . . . – timetable of work – functioning of the workshop – organizing the breaks – group photograph – immediate evaluation (doc.3)		
AFTER	+ 10		– Send a letter of thanks to the assistant organizers		
	+ 15		– Prepare a report on the workshop		
	+ 30 + 180 to 365		– Send the report to the participants to the responsible authorities – Start long-term evaluation – collect data – visit the participants – organize an evaluation meeting – publish an evaluation report		

Open a file

Correspondence relating to the planning, running and evaluation of a workshop will soon reach proportions that call for proper filing. A suitable system might be a loose-leaf file with the following subdivisions:

- Budget
- Workshop site
- Selection of participants
- Selection of assistant organizers
- Documentation
- Equipment checklist
- Publicity, press, etc.
- Evaluation

Aims of the workshop

In the particular case of an educational workshop, the aims have already been described on page 5.03. If the workshop has different aims, it is then necessary to define them explicitly.

Funds

Whatever social and political system you are working under you will need a budget. The person or persons who will ultimately be responsible for authorizing the expenditure involved will need at least one estimate. To work this out the following simple formula is suggested:

$$\boxed{E = (T + S) N \times 1.25}$$

E = Estimate
T = Costs of return travel* } per participant
S = Living expenses (accommodation, food) } per participant
N = Number of participants

In other words, travel costs and living expenses will amount [illegible] 80% of total costs, leaving the remaining 20% to cover the other expenses (room, reproduction of documents, etc). Where necesary add a percentage corresponding to the annual rate of inflation . . . . . and *get your budget approved*.

Date of the workshop

As the workshop will nearly always be attended by teachers, this should be taken into account when setting the dates of the workshop in order to avoid clashing with their professional commitments (e.g. sitting on an examinations board, annual congress).

You should also check whether the dates coincide with public or religious holidays, sports events or political meetings, as these may create problems with regard to reserving hotel rooms.

It is recommended that the first day of the meeting should not immediately follow a non-working day (such as Sunday, or Friday in Moslem countries), so as to ensure that at least one working day will precede the opening of the workshop.

Choosing the place for the workshop

(over 6 months before D-day)

It has been found from experience that, to make sure participants will attend on a *full-time basis*, the workshop will have to be held in a place far enough away from where participants live to enable them to take part in all activities without interruption and prevent them from being able to go home after the sessions or, more importantly, return to their laboratories or their patients.

This obviously implies a substantial financial investment but one that is justifiable from the point of view of cost/effectiveness.

The place chosen should preferably be secluded but agreeable and the conditions comfortable enough for participants to be able to recall with pleasure their first full-time plunge into the depths of the systematic approach to education.

Booking a meeting room and hotel accommodation

(6 months before D-day)

Waste no time in making the necessary bookings. Do it in writing and insist on *written confirmation* detailing the conditions you have specified, particularly as regards the meeting room (see p. 5.17 for details).

Ensure that the meeting room will be available 24 hours a day throughout the workshop. Wherever possible, a *visit to the*

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* Before working this out, read the paragraph on "choosing the place for the workshop" on this page.

premises is recommended before making a final decision. If the meeting room is too small, too noisy, badly ventilated or poorly lit, the workshop may suffer irreparably.

Criteria for selection of participants

Number of participants

It has been found from experience that as many as 35 participants (seven groups of five) can be handled by *one* organizer. By following the maxim "the less *you teach* the more *they learn*", it should be possible to increase the number of participants still further. However, there are no strict rules and it is advisable not to have more than about 15 participants for a first trial.

The number of participants is in practice limited by what the organizer feels he is capable of coping with and by what the participants think they need in the way of help from the organizer.

The documentation provided for the mini-workshop should enable each participant to progress by his own efforts and with the help of the stimulation provided by other participants *rather than with the help of the organizer*.

Type of participant

- Homogeneity

Although it is not necessary to have all the same kind of participants for a mini-workshop, since this type of workshop is mainly intended to provide a stimulus to the *individual*, it is advisable to select participants who will be in a position to work together after the workshop is over and who, by forming a *critical mass*, will have a greater chance of success.

On the other hand, in the light of experience it is not recommended that a workshop designed as an *introduction* to a new approach should be attended by a mixed group representing several professions (for example: physicians, nurses, dentists, medical assistants, sanitary engineers, etc.). The educational mini-workshop is going to force each participant to *question* many concepts that had previously seemed firmly established. This process is hard enough without increasing frustration by insisting that it is carried out outside the peer group.

The aim *at this stage* is not to create team spirit. It may be necessary to organize a mixed group later on in order to reach this goal.

- Voluntary participation
  and willingness to innovate

Attendance at the workshop should be *voluntary* and each participant should already have demonstrated his desire for change by having adopted new methods of his own. He should preferably be in a position of responsibility or be likely to acquire responsibility.

In cases where some of the documentation is not yet available in the national language, or if assistant organizers who do not speak the national language have to be called on, allowance must be made for this and participants selected who can at least *read* the language used in the documents available.

Please Note! **Important!**

To be accepted as a participant it is absolutely essential that: **applicants are aware they will be full-time participants for the duration of the workshop and** ***undertake to abide by this provision.***

Committee of sponsors

Setting up a Committee of Sponsors will not only give you an opportunity of honouring influential members of official circles but will also draw the attention of such circles to the action you have initiated and encourage them to follow it up. It is important that people in administrative positions (such as Rectors, Directors of Health and Deans) should be represented on such committees, which will be called on to apply the selection criteria defined earlier.

Selection of assistant organizers

(4 months before D-day)

If you have already attended a workshop of this kind yourself, do not be afraid to take *sole* charge of a group of about 15 participants.

However, if you do not have enough confidence in yourself yet, call in a more experienced consultant, ***preferably from another school or faculty***, and this will allow you to take a rather larger group (20–25).

In subsequent meetings with larger numbers of participants you are strongly advised to take on two (for 20 participants) or three (for 30 participants) assistant organizers (from those attending an earlier workshop). You will have to make sure at least four months before the workshop starts that they will be able to come, so as to give them time to make further study of the documents, in particular the *Educational Handbook*.

You are advised to choose assistant organize belonging to disciplines other than those represented by the participants, to prevent the proceedings turning into a discussion of their subject by experts rather than a consideration of the methodology of education.

The assistant organizers will have the task of finding answers to questions put by the participants and of channelling any questions that they cannot deal with themselves to the principal organizer.

Working language

Apart from the WHO Educational Handbook,[1] the remaining documents (1, 2 and 3) are short enough to be translated into the language of the participants of the workshop. At any rate all discussions, whether in small groups or in plenary session (unless outside consultants are used), ***may obviously be carried out in the national language***. Make arrangements for any translations to be done at once.

Invitation to the participants

(4 months before D-day)

It is now time to start the procedure leading up to the final selection of participants (see page 5.15). Where possible a *demand* for places in excess of the number you have decided on (page 5.07) should be created so that you will be able to correct the situation if there are any last minute cancellations. You are therefore advised to ***get in touch*** right away with the colleagues you wish to contact. A personal letter will generally be preferable to posting up a notice, but your decision here will depend on local customs. What "information" should be sent out at this stage? The main points to be covered are:

(a) aims of the workshop – prepare a letter of invitation based on the content of p. 5.03 as adapted to the target population.

(b) What is implied by the term workshop –you may annex to your letter the text on page 5.03.

(c) working methods of the workshop (document No. 1)

(d) theme of the workshop (document No. 2)

The text of the last two documents mentioned (1 and 2) will be found on the pages that follow. The required number of copies can be made by means of a stencil if you do not have access to other methods of reproduction such as an electronic stencil or a fast photocopying machine, for which the pages of this document may be used as originals. In any case the pages should be renumbered and the place and dates of the workshop should be mentioned on the cover page of each document under the title "Workshop in educational planning".

Your letter of invitation should also mention that *full-time participation* is essential (see box, page 5.07) and indicate any language stipulations.

Lastly, you should set a deadline for applications (45 days after the date of dispatch of the letter of invitation), mentioning that each successful applicant will be informed of his selection at the latest 45 days before the start of the workshop and that the basic documents will be sent to him at that time (under separate cover if you have a limited budget).

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[1] Which exists in Bulgarian, Czech, English, French, German, Hungarian, Indonesian, Italian, Polish, Portuguese, Russian and Spanish and is being translated into Arabic and Serbo-Croat.

workshop in educational planning

document 1

working methods of the workshop

5.09

working methods

The working methods proposed for this meeting may be somewhat different from those you are used to. It does not mean that these are new methods: they have been widely used outside the university and their effectiveness has been experimentally tested. They derive from the application of recent education theories. If they were to be identified by their main characteristic one would say they put emphasis on ***active participation*** of the learner while in traditional systems he is maintained in a relatively more passive role. The aim of the methods is to encourage you to develop a critical and constructive attitude and to find solutions for your own problems. Practical exercises raising specific problems that simulate real situations will lead you to propose valid solutions. Generally speaking, the working methods used in the workshop will enable you to put the educational principles recommended in the *WHO Educational Handbook* into practice.

1. Free choice of personal objectives

To ensure that the workshop fully meets ***your*** educational needs you will be invited to select the objectives you wish to reach by the end of the workshop (see p. 5.19). The meeting's programme of work will be organized on the basis of the choices made (p. 5.20).

2. Preliminary reading assignments (concerning objectives chosen).

To provide you with the theoretical knowledge in the field of educational planning that you may need to find solutions to practical problems and attain the objectives you have chosen, you will be invited to read certain documents (see p. 14). It should be made clear at this point that there will be ***no lecturing*** on the part of the organizers, not even a "short introduction to . . . ". Study of the recommended texts will be your own responsibility.

3. Clarifying sessions

These are generally held as the first working session of each day. Their aim is to ensure that participants have a clear idea of what they are to do in the hours that follow and that any instructions have been understood. They are not intended, however, to be in-depth discussions, which will be held either during working groups or during summing-up sessions.

4. Practical exercises

These exercises, which are described in detail in the Educational Handbook, are to be done individually ***at first***. Then discussion will start by comparing each participant's proposed solutions. This exchange of views may take place in pairs before extending to the entire small group; if the exercise implies that each one within the group has a specific task related to a common goal, it is up to the group to get organized. This task distribution will ***not*** be done by the organizers. Group dynamics will operate with its highs and lows, periods of tension and relaxation as in all human endeavours.

5. Group presentation

Plenary sessions will be held as often as necessary, depending on the programme of work based on the personal objectives chosen by the participants. Their aim will be to allow group solutions to be presented, not for the purpose of judging groups but to compare ideas for possible consensus under the leadership of a participant or, exceptionally, an organizer.

6. Preview of next working day

Each day before closing a short period will be reserved for a preview of the following day's activities and a reminder of the aims of reading assignments.

Any changes of programme will be called to the participants' attention.

7. Individual consultations

In view of the biological principle of individual differences it is most likely that participants will progress at different rates, desiring to study in more or less depth certain questions, or be interested in differing applications of the theories and methods proposed during the workshop. The organizers will therefore make themselves available on request for individual consultations on subjects of special interest.

8. Formative evaluation

8.1 *Pre-test* -- To help direct your efforts and inform you of your own progress during the workshop, an evaluation process is proposed. Details are given on page 9 of the Educational Handbook. This test will help you to identify the "educational areas" which may need attention. ***The object of the pre-test is not to find the "right" answer but simply to register that you have not found it***. The purpose of the workshop is to help you to find it, either during the workshop itself or in the ensuing months. The post-test will enable you to measure your progress as time goes by.

8.2 *Daily personal evaluation* – You should assess your own progress each day. This will give you an opportunity of modifying the objectives you chose (para. 1) on the first day.

8.3 *Daily group evaluation* – At the end of each daily session time will be set aside for joint assessment of the extent to which the ***working methods used*** have helped you towards reaching the objectives you have selected, and for proposing any change in the functioning of the workshop.

8.4 *Evaluation questionnaire* – Shortly before the end of the meeting you will be invited to express your opinion on the organization of the workshop by means of a questionnaire (document 3, p. 5.25). The results will be analysed during the last session.

8.5 *Long-term evaluation* – To help you assess the benefits you will continue to reap from this workshop, you will be asked to define explicitly the professional objectives you expect to reach within the next twelve months in relation to the experience acquired during the workshop. It is recommended that all participants meet twleve months after the workshop to assess what they have achieved.

These various aspects of the working methods that will be used during the workshop will be clarified during the first session.

You may now start preparing for the workshop in whatever time you have available.

1

– If you want to get a general idea of the field that will be explored during the workshop, study document No. 2 (Introduction to Educational Planning).

2

– If you want to select the personal objectives you would like to reach by the end of the workshop, refer to pages 11 – 13 (Identification of your needs as an educator) of the Educational Handbook, which you will be sent if you are selected to participate.

3

– If you want to go still further, you can use the Educational Handbook to pursue the objectives you have selected.

Good Luck!

workshop in educational planning

document 2

theme of the workshop = introduction to educational planning

Note to organizer of educational workshop

It is suggested that in preparing this document you use the text that appears on pp. 1.05 – 1.07 of the Handbook or the section on "Distinctive attributes of education for the professions" (pp. 3.05 – 3.12).

The theme of the workshop will therefore be the health manpower training process, covering the four main stages (see the Educational Spiral, p.1.06):

- definition of relevant educational objectives
- planning of an evaluation system
- development of an effective educational programme
- application of a valid system of evaluation

Selection of participants

(2 months before D-day)

The deadline for applications has now expired and you should convene the Committee of Sponsors. They will choose from among the applicants those who correspond most closely to the criteria defined earlier (see page 5.07). Your function will be to make sure that the Committee follows these rules ***properly***.

In addition to the number of participants decided on, the Committee should select some *reserves* (20–25% extra) to provide replacements in the case of last-minute cancellations.

Confirmation of participants

(45 days before D-day)

It is now time to write to the applicants who have been selected, reminding them of the conditions of participation ***(full-time attendance compulsory)*** and of the place and dates and sending them the *Educational Handbook*, with a recommendation that they reread p. 5.12 if they wish to start work.

In point of fact, distribution of the *Handbook* could just as well wait until the start of the workshop since it is ***not essential*** to study it beforehand. However, it has been found from experience that many participants complain at the time of final evaluation that they were not given *all* the documentation before the workshop (including those who would not have had time to read it). In short, although it is not essential for participants to receive the *Handbook* one month before the workshop, there is no reason why they should not have it and there may be some advantages.

Staff and equipment needed for document reproduction during the workshop

(One month before D-day)

It will be extremely useful to have a secretary or typist available during the meeting for typing the documents resulting from group work. Since participants generally wish to have access to the results of their colleagues' work, equipment for fast, good quality reproduction will also be needed. Each document should have a reference number for ease of consultation.

The secretary can also help with logistic matters (hotel rooms, problems concerning transport, finance, etc.) on the participants' arrival, thus freeing the organizers to spend more time on purely educational activities.

Now is also a good time to make copies of page 5.20 , which each participant will need on the ***first day***, and of document 3, "Evaluation of the workshop by the participants", which you will distribute towards the end of the workshop (see p.5.25).

Select participants who are most likely to benefit from the workshop. Be consistent in maintaining contact with them.

Carole J. Bland

Note

Now is the time to order however many copies you need of the WHO Educational Handbook for Health Personnel, unless your national authorities already have a stock that you can use.

Equipment checklist

(One month before D-day)

Equipment	already there	to be brought	checked
Note pads (one for each participant + 20%)			
Pencils (one for each participant + 50%)			
Rubbers/erasers (one for each table)			
Pencil sharpeners (one for each table)			
Two-hole punch (1)			
Adhesive tape (2 rolls, incl. one wide)			
Stapler (1)			
Waste paper baskets (one for each table)			
Projection screens (2) or white wall			
Cardboard envelope files (2 for each participant)			
Overhead projectors (2)			
Spare projector lamps (2)			
Electric extension flex (6 metres)			
Electric adapter plugs (2)			
110/220 V transformer (check local voltage)			
Transparent cellulose sheets (50)			
Marker crayons for writing on cellulose sheets (water soluble) (12)			
Blackboard or, preferably, large flip-chart			
Photocopying machine			
Dictionary			
Extra copies of Educational Handbook (20%)			

You will find this list useful for checking what you should bring with you to the workshop and for making sure the day before the workshop begins that *everything* is in place.

Press relations

Depending on the local situation, it may be worth deciding to inform the press. If so, it is always best to prepare a press release yourself rather than leaving this task to a journalist, no matter how conscientious he may be.

If you invite the press to interview the participants (for example when the ***group photograph*** is being taken) the best time for this will be during the break (see p. 5.24) on the last day (or the last day but one). This is also a good time to invite your superiors, those providing funds and other dignitaries. *Never* choose the first day for this, as the participants are likely to be in a state of considerable confusion!

Review of the list of participants

(one week before D-day)

In some cases there will be cancellations. As these occur you should get in touch with the applicants selected as reserves to fill the empty places. Make sure once again that participants have all the documentation required and that they know the date and place of the workshop.

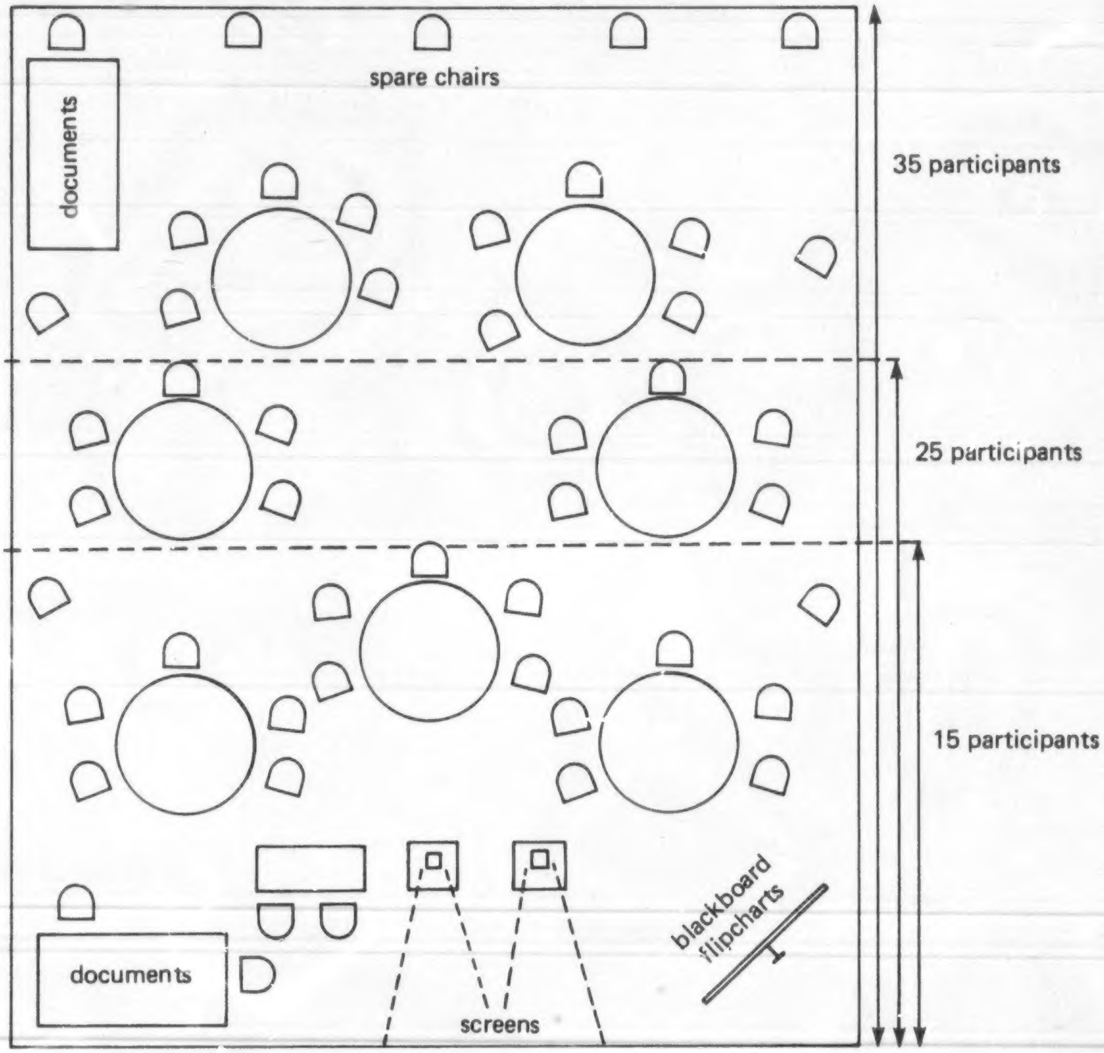
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Check regularly what you have done and what remains to be done.

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Arrangement of the room

(2 days before D-day)


spare chairs
documents
35 participants
25 participants
15 participants
blackboard
flipcharts
documents
screens

(depending on the number of participants)

The meeting room should be arranged so as to:

- allow participants to sit at small tables in groups of three to five;
- allow the use of an overhead projector (two would be preferable so that two documents can be compared).

The arrangement shown above is suggested for 15, 25 or 35 participants.

During plenary sessions, participants just have to turn to face the organizer. Make sure that everyone has a good view of the projection screen and the discussion leader.

It has been found from experience that the noise threshold (in group discussions) is quite bearable and that *this arrangement is preferable to separating groups in different rooms.* It allows for much more flexibility in organizing the sessions.

Make sure that the room is not too near a source of noise (restaurant, school, demolition site, etc.).

The less the meeting room looks like a "classroom" the better.

Make sure that each participant has enough table space to lay out his documents and that it is well lit.

The overhead projector does not require a darkened room, but you should still make sure the *day before* the workshop starts, at a time when natural daylight is at its brightest, that the picture projected is clearly visible. Make sure that there is at least one electric power point that works and have an electric extension flex and spare projector lamp available. In addition have a stock of transparent cellulose sheets and marker crayons (erasable) available so that participants, or you yourself, may illustrate any remarks that may be made in plenary sessions.

Use the checklist of the equipment you will need during the workshop when making your last inspection of the room the day before the meeting starts (page 5.16).

Coordination of assistant organizers

(2 days before D-day)

All assistant organizers should be on the spot without fail *at least two whole days* before the start of the workshop and should have been told how important this coordination period is.

The principal organizer should make sure that each assistant organizer knows what is expected of him during the workshop and is prepared to carry it out.

The two days preceding the workshop will therefore be a sort of dress rehearsal for what is expected to happen during the workshop. Each assistant organizer ought to give an account in his own words of the part he thinks he can play.

All organizers will need to be thoroughly familiar with the documentation for the workshop and these two days provide a good opportunity for organizers to exchange views and prepare the way for working together smoothly. Several informal meetings will probably be useful, one of which should be in the room in which the workshop is to be held.

The organizers must also decide what criteria to apply (mixing of disciplines, grades, sexes, natural leaders, "heavies", etc.) in dividing the participants into groups (of three to five) and assigning them places, which should be marked by name-cards.

The evening before

In theory all the participants will have arrived and have their hotel rooms. Before supper, it is recommended (if finances allow) that you organize a "friendly drink" to break the ice and enable participants and assistant organizers to make themselves known to each other. This should be as informal as possible.

D-day is here . . . .

Although it is in the nature of a workshop not to have a strict hour-by-hour timetable, in the case of a mini-workshop some details may be given on the procedure it is recommended to follow, at least for the first day. The first hours of the first day are of crucial importance. The working atmosphere will change in the course of the three days: roughly speaking the first day will be one of confusion, the second one of productive thought and the third one of stunned realization that there is much more to learn than appears at first but that it is worth making the attempt and that this is only the beginning . . .

With regard to the rate at which the subject matter is dealt with in the time available, each participant should be left to work at his own pace and according to his own system of priorities. On the other hand, as the participants form themselves into working groups, a "common tempo" will be established.

programme preparation

In order to prepare a working programme for the workshop **that is relevant to your own needs** in the field of education, you are invited to choose from among the objectives listed on pages 12 and 13 (divided into four main themes) those that interest you and that you would like to achieve by the end of the workshop.

As the duration of this workshop is limited, try to be realistic in your choice. Some of these objectives may require only a few minutes' work; others several hours to allow for study of the documents made available to you (see suggested texts, p. 14).

To make it easier to choose, rearrange the objectives listed in order of importance to you. Once you have made your choice, fill in page 5.20 and hand it to the workshop organizer.

In the light of what you have selected, a programme of work can be drawn up. You will be given a list of the participants who have chosen the same objectives as yourself, so as to facilitate the organization of small working groups engaged in common activities* (see example, p. 5.21).

It is natural that you should have some difficulty in making your choice at this early stage in the meeting. Do not hesitate to consult an organizer . . . and above all remember that if necessary you can always modify your choice during the workshop.

Some of the objectives may be achieved more easily by group work. These objectives are marked on pp. 12 and 13 and p. 5.20 by an asterisk.

Circle the number corresponding to each objective you have chosen

1	6*	11	16*	21	26*	31	36
2	7*	12	17*	22	27*	32*	37
3*	8*	13	18*	23	28*	33*	38
4*	9*	14	19	24*	29*	34*	39*
5*	10	15	20	25	30	35*	40

Additional Objectives
(optional)

By the end of the workshop I should like to be able to:

Name . . . .
[block capitals]

Hand a copy of this page to the organizer of the workshop before the break in the first session.

5.20

How to prepare a working programme based on the objectives selected by the participants

Obj.	List of participants according to choice of objectives suitable for group work (no more than five per group)		Proposed programme of work
3 4 26	Brian, Alan, Ian, Paul, Alfred, Claudia, Elsie, Emily, Margaret, Fred, Michael, Alfred, Albert, Julian, Harriet, Frank, Felix, Jack	⑱	Group work 3 – 4.30 p.m. Plenary Session 5 – 6 pm Tuesday
5 to 8	Claudia, Emily, Alan, Frank, Brian, Margaret, Paul, Andrew, Philip, Elsie, Ian, Jack, Harriet, Alfred, Alan, Julian, Michael, Felix, Fred	⑲	Group work 9 – 10.30 a.m. Plenary Session 11 am – 12.30 pm Wednesday
16	Emily, Alfred, Frank, Harriet, Ian, Andrew, Jack, Julian, Fred, Michael, Felix, Claudia, Brian, Alan, Elsie, Paul	⑯	Group work 3 – 4.30 pm Plenary Session 5 – 6.30 pm Wednesday
17	Felix, Margaret, Peter, Fred	④	Individual consultations
24	Michael, Alan, Emily, Paul, Claudia, Ian, Jack, Harriet, Alfred, Philip, Brian, Elsie, Frank	⑬	Group work 9 – 10.30 am Plenary Session 11 am – 12.30 pm Thursday
27	Alan, Michael, Margaret, Julian, Andrew, Felix	⑥	Individual consultations
28	Felix, Michael, Julian, Alan, Emily, Alfred, Harriet, Jack, Ian, Paul, Elsie, Andrew, Margaret, Brian, Frank, Philip, Claudia, Albert, Peter	⑲	Group work 3 – 4 pm Plenary session 4 – 4.30 pm and 5.30 – 6.30 pm Thursday
9 18 29	Felix, Michael, Julian, Alan, Emily, Alfred, Harriet, Jack, Ian, Paul, Elsie, Andrew, Margaret, Brian, Frank, Philip, Claudia, Albert, Peter	⑲	
32	Peter, Fred, Felix, Margaret, Elsie	⑤	Individual consultations
33 to 35	Elsie, Frank, Andrew, Margaret, Fred	⑤	Individual consultations
39	Fred, Peter, Albert, Julian, Felix	⑤	Individual consultations

% 10 20 30 40 50 60 70 80 90

Example of a proposed programme prepared on the basis of the objectives selected by participants in a workshop

The length of the arrows indicates the *percentage* of participants who have chosen any one objective. The actual number is circled.

5.21

First day: first session

8 to 10.30 am

1. *Opening*

In your opening remarks you will of course formally welcome the participants, thank those who have made the workshop possible, recall the overall aims of the workshop (see page 5.03) and relate it to the local teacher training situation. Make clear too that the workshop offers each participant a golden opportunity for ***uninterrupted*** thought on problems that are universally admitted to be important but are frequently neglected; that no-one there is any cleverer than anyone else; that the workshop belongs to the participants and will be what they make of it; and that the third day will not be the end of the workshop but rather the start of a long and exciting process. These remarks should not take more than five minutes.

2. *Clarification of documents*

Go on without a break to this item. Ask the participants to turn to document No. 1 (Working Methods) and go through it page by page and paragraph by paragraph asking them if there are any points they would like *clarified*. If there are no questions on a paragraph, describe its central theme without going into details. If a question is raised, ask whether any other participant would like to clarify the point concerned. Do not forget (and remind participants where necessary) that the object of the exercise is to clarify obscure points and not to discuss the subject matter in depth. There will be time for such discussion throughout the rest of the workshop either in small working groups or, occasionally, in plenary session.

It has been found from experience that there is no point at this stage in a clarification session for document No. 2 (Theme of the workshop). The necessary definitions and detailed explanations are dealt with in the exercises designed to help achieve the workshop objectives.

It will now be between 8.45 and 9.15 am and time to pass on to the next item.

3. *Programme preparation*

The (individual) programme of work for each participant will now be prepared. Ask participants to turn to page 5.19 of the *Handbook* (Programme preparation) and make sure that the text of the first page has been understood. Next, mention that the 40 objectives listed are the same as those in the *Educational Handbook* and that the cross-references to the relevant pages of the Handbook given on page 14 are intended to facilitate selection of objectives. The selection made should be indicated by filling in page 5.20 and handing it in to the organizers by 10.30 am at the latest. During the break, using the information produced in this way, you will draw up a list of participants who have chosen identical objectives so that they may form themselves into groups for joint work (see example p. 5.21).

The first plenary session will now be over and the time will be between 9 and 9.30 am. From this point until the start of the break (10.30 to 11.00) it will be the task of the assistant organizers to ***deal*** individually with any requests from participants. Towards 10.00 am make a rapid tour of the room to see how the participants are doing and by about 10.15 remind them if necessary that they have 15 minutes left for handing in page 5.20.

First break

(10.30 to 11.00 am)

This is when the organizer will draw up the list (on a flip chart) of the participants who have selected identical objectives so that they can form groups for joint discussion. The list will enable the organizer to prepare a draft programme of work for the rest of the workshop. Any objective that has attracted the interest of one-third of the participants should be dealt with in plenary session. Since each presentation will require preparatory work by groups of participants (no more than five per group), enough time should be allowed for this (either during morning sessions or in extra sessions held in the afternoons or, exceptionally, the evenings). Since you have the gift of being everywhere at once, you should also make sure that coffee, tea or other drinks, and rolls and sandwiches are available to the participants.

First day: second session

11.00 am to 1.00 pm

At about 10.55 am invite the participants to come back to the room. Present the draft programme (see example, p. 5.21) and as soon as it has been accepted tell the participants that they can start working (on an individual basis at first) through the list of objectives they have selected; that if they wish to find out what they know, they should now take the pre-test (at least on the first chapter of the Handbook); that they may call on you if they need any help; that they may subsequently, if they wish, start exchanging their work and discussing it with other participants, whom they may choose from the list given on the flip chart (which you may now have reproduced for general distribution).

Until then *take no other action* apart from being available to give help if necessary.

At 12.55 pm you will have a few minutes left to congratulate participants on their dedication and keenness and reassure them if they are feeling completely confused about what is happening that things will be better tomorrow and even better the day after tomorrow. Lastly, invite them to spend the afternoon continuing to clarify their ideas by further reading on any points worthy of attention and tell them that you will be available for individual consultation.

It will now be 1.00 pm. Wish everyone a pleasant lunch and confirm the time and the aims of the next activity on the programme that has been approved[1]

First day: afternoon session

Begin by reminding participants of the time of the next plenary session. Make sure that each small group knows what it is supposed to be doing, then give no further help unless asked. You can, however, go around the room taking a friendly interest in what each person is doing: adapt your attitude to the reactions shown by the participants. See that each group has a supply of transparent cellulose sheets and marker crayons.

Ten minutes before the time set for the session, check that each group is almost ready. As for the general organization of the plenary session, all you need to do is to present the transparencies prepared by each group, using the overhead projector, and encourage discussion.

Fifteen minutes before the end of the last session of the day, call for everyone's attention. Invite the members of each group to discuss among themselves the positive and negative aspects of this first day and ask for a verbal report from a spokesman for each table.

Second (and third) day

The participants will start organizing their work themselves and your task will be to help them do this. Start the day with a short *clarification* session (15 minutes) which this time it will be worth your while to initiate within the groups and finish in plenary session. Next, mention that as on the previous day there will be a plenary session at the end of the day for evaluation of the day's work and invite everyone to set to work. Add that in the event of one (or several) working groups forming and wishing to submit the results of their work to the others, further short plenary sessions may be held on request. Make sure that, should this happen, there are enough tranparent cellulose sheets and marker crayons for participants to make their reports using the overhead projector.

At the end of the session, after evaluation of the day's work, invite participants to draw up for the following day a list of the ***professional objectives*** they wish to reach during the next 12 months in the light of what they have "learned" during the workshop, and ask them to fill in the evaluation questionnaire (document No. 3) and return it to you by 8.30 next morning at the latest (page 5.31 will tell you how to analyse the results of the questionnaire).

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[1] Another scenario may be imagined in which by 8.30 am. the participants have settled down to a poker game. This would indicate that you need to review your planning procedures, including the method of selecting participants (page 5.07).

Last day

(Don't forget to have a *group photograph* taken during the break, unless it has already been done).

After a short period for clarification, remind the participants that it is very important to devote most of this last day to finalizing the individual professional objectives to be reached during the next 12 months. (See document No. 1, paragraph 8.3). These should be the subject of exchanges of views between participants and of group discussion before being handed to the organizers. The last half-hour of the last day should be given over to an evaluation session (in the light of the analysis of the questionnaire/document No. 3), ending with a few closing remarks dealing mainly with the *future*.

Letters of thanks

(15 days after the workshop)

It is now time to thank everybody who has helped you, including those who have provided funds for the workshop, the members of the Committee of Sponsors and the assistant organizers, if any. Inform them in the letter that they will shortly be sent the report on the workshop.

Report on the workshop

(15 days after D-day)

Even if the purpose is only to inform those who have provided the funds for the workshop or to ***help participants to inform other colleagues***, it is a useful exercise to prepare a report during the weeks following the workshop.

The report will contain:

- an *introduction* giving a brief description of the local context which led to the organization of the workshop
- the *general aims* of the workshop
- a description of the *operation* of the workshop mentioning how participants adapted to the working methods
- some selected samples of the results of individual or group work
- the list of documents used during the workshop
- the results of immediate evaluation, including an analysis of the questionnaire (document No. 3)
- the list of participants (with their addresses)

Long-term evaluation

(at the latest one year after D-day)

Long-term evaluation is essential since it is the only way to measure *the actual impact* of a workshop.

It will be based on an assessment of the extent to which each participant has reached, failed to reach or exceeded all or some of the *professional objectives* he set himself at the end of the workshop (see page 5.23). An assessment of this kind may be made by means of questionnaires, by individual interviews or, preferably, by bringing all participants together again for a one-day meeting. A report summing up the results of long-term evaluation is well worth preparing and distributing.

workshop in educational planning

document 3

evaluation of the workshop by the participants

Instructions for questions 1 – 35

Use the following code to indicate the extent to which you agree or disagree with each of the statements made below:

Code	
1	Strongly disagree
2	Disagree
4	Agree
5	Agree strongly

The difference between 1 and 2 or between 4 and 5 is one of degree only.

Example:

If you want to express your complete disagreement with the statement, circle the figure 1 as follows ① 2 4 5

Please feel free to make any comments you think necessary (making reference to the number of the question) in the space reserved for the purpose on the last page.

			Do not write in this column
I	*Aspects relating to the planning of the workshop*		
Q.1	I was given sufficient information on the aims and methods of the workshop before my arrival	1 2 4 5	
Q.2	The planning of the workshop reflected the educational principles that were discussed there	1 2 4 5	
Q.3	It was clearly explained to me at the start how I was to choose my objectives for the workshop	1 2 4 5	
Q.4	I feel that the programme drawn up during the first session took my own choice of objectives into account	1 2 4 5	
Q.5	The goals of the workshop appeared to me to be of immediate interest for my professional activities	1 2 4 5	
Q.6	It was clear to me from the start of the workshop that I was expected to play an active part in it	1 2 4 5	
II	*Aspects relating to the relevance and utility of the working methods*		/6
Q.7	I found the documentation provided of an acceptable quality	1 2 4 5	
Q.8	Enough documentation was provided to allow me to take an active part in the discussion of the subjects concerned	1 2 4 5	
Q.9	The information given in the *Educational Handbook* helped me to reach the objectives I had chosen for the workshop	1 2 4 5	

Q.10	The working methods used during the workshop encouraged me to take an active part in it	1	2	4	5
Q.11	I have had the opportunity during the workshop of putting new knowledge into practice (exercises)	1	2	4	5
Q.12	Spending time on individual work during the workshop helped me to learn	1	2	4	5
Q.13	During the workshop I was *given* the opportunity of working at my own pace	1	2	4	5

7

III *Aspects relating to the way the workshop was run and to the attitude of the organizers*

Q.14	The organizers displayed a satisfactory open-mindedness	1	2	4	5
Q.15	The general atmosphere of the workshop was conducive to serious work	1	2	4	5
Q.16	The organizers gave me the opportunity for critical comment	1	2	4	5
Q.17	The organizers made use of any critical comments I made during the workshop	1	2	4	5
Q.18	The organizers made every effort to help me reach my objectives for the workshop	1	2	4	5
Q.19	The way the workshop was conducted was in line with the educational principles it discussed	1	2	4	5
Q.20	The attitude of the organizers was conducive to "free learning"	1	2	4	5

7

IV *Aspects relating to the organization of activities in the time available*

Q.21	I consider that enough time* was given for individual or group discussions with the organizers	1 2 4 5	☐☐
Q.22	Enough time* was devoted to clarifying the documents	1 2 4 5	☐☐
Q.23	Enough time* was given for discussion in small groups	1 2 4 5	☐☐
Q.24	Enough time* was given for practical exercises	1 2 4 5	☐☐
Q.25	Enough time* was given for individual work	1 2 4 5	☐☐
Q.26	Enough time* was given for the presentation of work in plenary session	1 2 4 5	☐☐
			/6

V *Aspects relating to the benefits gained by the participants*

Q.27	The workshop helped me to improve my knowledge of education theory	1 2 4 5	☐☐
Q.28	The workshop helped me to develop a favourable attitude towards the systematic approach to educational problems	1 2 4 5	☐☐
Q.29	The workshop has encouraged me to put the knowledge I have gained into practice *after* the workshop is over	1 2 4 5	☐☐
Q.30	The workshop will help me to encourage my colleagues to learn and make use of new educational methods	1 2 4 5	☐☐
Q.31	The workshop has increased my confidence in my ability to achieve my personal objectives in the medium term (within one year)	1 2 4 5	☐☐
			/5

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* All questions asking for an opinion on the time spent on an activity must be considered in relation to the total time available for the workshop. If you wish to comment on the length of the workshop as a whole, please doso using p. 5.30.

VI *Aspects relating to evaluation of the workshop*

Q.32 I felt that the pre-test and the follow-up test helped me to make a useful assessment of the knowledge I gained 1 2 4 5 ☐☐

Q.33 The pre-test was a useful exercise and showed the advantages of this technique 1 2 4 5 ☐☐

Q.34 The practical exercises showed the usefulness of "feedback" during the learning process 1 2 4 5 ☐☐

Q.35 I found the daily evaluation sessions useful 1 2 4 5 ☐☐

4 ☐

	Q ⊕	%	Q ⊖	%
1				
2				
3				
4				
5				

Ch. I ☐☐

II ☐☐

III ☐☐

IV ☐☐

V ☐☐

VI ☐☐

35 ☐

With regard to the planning of the workshop, its method of work and the attitude of the organizers, note below and give actual examples of:

(a) The factors which impressed you ***most favourably***

(b) The factors that impressed you ***least favourably***

(c) Total length of the workshop

too short ☐ adequate ☐ too long ☐

Further comments and suggestions

Note for the Organizer on how to analyse the answers to this Questionnaire

A very simple analysis may be carried out as follows.

Take an uncompleted questionnaire and mark beside each question the answers given by each participant. For example, for 30 participants, the answers to question 6 might be:

			II	卌 卌	卌 卌 卌 III		
Q.6	It was clear to me from the start of the workshop that I was expected to play an active part in it	1	2	4	5	134	89.3

In other words, two participants considered that they did not understand from the start that they were expected to play an active part in the workshop while the 28 others understood this. Multiplying the number of answers by the corresponding coefficient gives a total of:

$$(2 \times 2 + 10 \times 4 + 18 \times 5) = (4 + 40 + 90) = 134.$$

The "satisfaction index" is calculated by multiplying this number by 20 (i.e. 100 divided by the maximum coefficient 5) and dividing it by the number of participants, in this case 30. This gives:

$$\frac{134 \times 20}{30} = \frac{2680}{30} = 89.3\%$$

It is recommended that you then make a note of any questions with a "satisfaction index" *below* 60%[1]. If there are none, identify the five questions with the lowest "satisfaction index" and then the five questions with the highest "satisfaction index". Let the participants have these results at the final evaluation session on the last day of the workshop.

---

[1] The satisfaction index is calculated in such a way that "average satisfaction" is $\frac{100 + 20}{2} = 60\%$

VII Personal objectives

1. Write down the objectives you hope to achieve during the year following this workshop, so that you can assess the progress made.	2. Write down, for each of these objectives, a working timetable that will enable you to achieve them.

Name ____________________

Keep a copy of this page and give the original to one of the workshop organizers.

afterwards . . . .

Do not succumb to the illusion that everything is now going to be different in the institution where you work. Do not think that from one day to the next conservative elements will turn into reformers, passive elements into active ones or opponents into supporters.

First, if you manage to persuade at least 20% of those taking part in the workshop to make a lasting and visible change in their teaching habits during the ensuing year, you may consider the workshop to have been a success. This will not be the case if all you do is record how many participants expressed satisfaction during the evaluation on the last day of the workshop (even if the figure is 100%).

Secondly, your work is not yet over. Do not let the seed you have planted with so much effort wither away. Continue to stimulate your colleagues in responsible positions in your teaching institution to see that those participants who improve their teaching methods are "rewarded" in some way.

. . . . If this is impossible, do something about it yourself – congratulate them – it will always be appreciated.

A workshop

Don't think it will change nothing:

Don't believe it will change everything

Recapitulative answer sheet for post test*

Chapter I

1 A B [✓ C] D E
2 A [✓ B] C D E
3 A B C [✓ D] E
4 A B C D [✓ E]
5 A [✓ B] C D E
6 A B [✓ C] D E
7 A [✓ B] C D E
8 A B C [✓ D] E
9 [✓ A] B C D E
10 A B C D [✓ E]
11 A [✓ B] C D E
12 A B C [✓ D] E
13 A B [✓ C] D E
14 A B [✓ C] D E
15 A B C D E [✓ F] G
16 [✓ A] B C D E F G
17 A B C D E F [✓ G]
18 A [✓ B] C D E F G
19 A B [✓ C] D E F G
20 A B C [✓ D] E F G

Chapter II

1 To facilitate educational decision-making

2 A B C D [✓ E]
3 A B C [✓ D] E
4 [✓ A] B C D
5 A [✓ B] C D
6 A B [✓ C] D
7 A [✓ B] C D
8 A B [✓ C] D
9 C [✓ CF]
10 C [✓ CF]
11 C [✓ CF]
12 [✓ C] CF
13 [✓ C] CF
14 C [✓ CF]
15 C [✓ CF]
16 [✓ C] CF
17 1. Definition of criteria for educational objectives.
2. Development of instruments
3. Interpretation of results
4. Formulation of judgments

18 A [✓ B] C D E
19 A B C D [✓ E]
20 [✓ A] B C D E
21 A B C [✓ D]
22 A [✓ B] C D E
23 A B [✓ C] D E
24 A B C [✓ D] E
25 A [✓ B] C D E

Chapter III

1 A B C D [✓ E]
2 A B [✓ C] D E
3 [✓ A] B C D E
4 A [✓ B] C
5 [✓ A] B C
6 A [✓ B] C
7 A B [✓ C]
8 A B [✓ C] D E
9 A B C [✓ D] E
10 A [✓ B] C D
11 A B [✓ C] D
12 A [✓ B] C D
13 A B C [✓ D]
14 A [✓ B] C D
15 [✓ A] B C D
16 A [✓ B] C D
17 [✓ A] B C D
18 A B [✓ C] D
19 [✓ A] B C D
20 A [✓ B] C D

Chapter IV

1 A B C D [✓ E]
2 A B [✓ C] D E
3 [✓ A] B C D E
4 A B [✓ C] D E
5 A B C [✓ D] E
6 A B C [✓ D] E
7 A B [✓ C] D
8 [✓ A] B C D
9 A B C [✓ D]
10 [✓ A] B C D E
11 A B [✓ C] D
12 A B C [✓ D]
13 A B C [✓ D]
14 [✓ A] B C D
15 A B C [✓ D]
16 A [✓ B] C D
17 [✓ A] B C D E
18 A B C [✓ D] E
19 A B C D [✓ E]
20 [✓ A] B C D

*The questions appear on pages: 1.57 – 1.60, 2.45 – 2.47, 3.79 – 3.83 and 4.75 – 4.80.

glossary 6

glossary*

This glossary of technical terms used in test and measurement, psychology and education is intended primarily for persons with limited training in test and measurement rather than for specialists. The terms defined are those most commonly found in test manuals and simple research reports. In the definitions, niceties of usage have sometimes been sacrificed for the sake of brevity, and, it is hoped, clarity.

The terms and definitions included are purely *ad hoc*, for the purposes of this Handbook alone; they represent only the view of the authors and do not necessarily have any validity outside the context of the Handbook. There is not complete uniformity among writers in the measurement field with respect to the use of certain technical terms; in cases of varying usage, either these variations are noted or the definition offered is the one that the writer feels is the "best".

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*Adapted from Roger T. Lennon, "Test Department", Harcourt, Brace and World Inc. Revised by J. -J. Guilbert (WHO); G. and L. Masse, ENSP, Rennes (France); B. Pissarro, University of Paris (France) and J. C. Chancerel, University of Neuchatel (Switzerland).

A

Absolute criteria test 13, 461–464

Acceptability index 461–463, 479–480

Acceptable level of performance

Also called acceptable passing level (or minimum passing level) 13, 143–144, 150, 154, 204, 221, 246, 402, 425, 429–430, 461–463, 480

Act

Action performed by a person 149–152

Act, professional

Corresponds to a practical skill; the knowledge how to do something and adoption of the appropriate attitude 12, 102, 109, 135-140, 143, 149, 156

Active methods

As opposed to the conventional methods described by Jean Piaget as "receptive"; an educational situation whereby the student assimilates the curriculum independently and progresses by means of individual exercises, the role of the teacher being limited to guidance of the student in choosing his/her educational objectives and monitoring of his/her performance 323, 328, 365, 381

Activity

Group of acts and tasks performed by a person 6, 12, 13, 102, 108, 110, 112–115, 118–119, 123–135, 140, 156, 158, 163, 212, 214–216, 245, 302, 307, 309–310, 313, 317, 318–319, 324, 333, 334–336, 339, 348, 353, 359–360, 371, 382, 404, 409, 413, 416–417, 422–423, 526, 528

Affective

Concerning the feelings; affectivity is the combination of acts and tendencies which express the feelings felt towards others; it is situated primarily on the level of interpersonal relationships. It is often employed to qualify attitudes. The word "affect" is a neologism used by psychologists to designate an affective state. See also Attitude 246, 412

Aim,

The end envisaged; a teaching or educational goal, the result expected from a programme. 6, 12–13, 102, 105, 107, 109, 111, 133–134, 144, 159, 202, 215–219, 245, 302, 308, 319, 363–364, 382, 405, 417, 441–442, 461, 468, 503–511, 522

Aptitude

A combination of abilities and other characteristics, whether inborn or acquired, known or believed to be indicative of an individual's ability to learn in some particular area. Thus, musical aptitude would refer broadly to that combination of physical and mental characteristics, motivational factors and conceivably other characteristics, which is conducive to acquiring proficiency in the musical field. Some exclude motivational factors from the concept of "aptitude", but the more comprehensive use seems preferable. The layman may think of "aptitude" as referring only to some inborn *capacity*; the term is no longer so restricted in its psychological or measurement usage. See Skills.

Arrangement of meeting room (for educational workshop) 517

Assessment. See Evaluation

Attitude

The internal disposition reflected by one's behaviour with respect to persons, events, opinions or theories. In the Handbook it is used to denote only a relatively constant disposition of feeling towards someone (personal relations) 135–141, 155, 221, 230, 306–312, 321, 346, 423–424, 527

Audio-visual aids. See Media

B

Bedside teaching 342

Behaviour

The total reactions (of an individual) accessible to external observation. Thought and understanding are implicit aspects of behaviour which are observable not directly, but solely by inference from other observable types of behaviour. 13, 104, 109, 137, 139, 155, 157, 211-212, 214, 221, 233, 246, 306-311, 318, 320, 326, 379, 402, 423

Blackboard 344, 516

C

Central tendency, error of. 453

Certifying evaluation 12, 108, 202, 215-216, 219, 315, 364, 450

Checklist (Of action to be taken for educational workshop). 504, 505, 506

Checklist (Of equipment for educational workshop). 516-517

Classification

Systematic division into classes. 137-140

Coefficient of correlation (r)

A measure of the degree of relationship, or "going-togetherness" between two sets of measures for the same group of individuals. Two coefficients of correlation are used in psychology, first the Pearson (r), developed at the beginning of the century by the British statistician Karl Pearson, and, secondly, Spearman's correlation coefficient (rho). The first is more powerful, but the data observed must be normally distributed and their variances must be homogeneous. Furthermore, the calculation takes longer unless a computer is available. The second, whose formula is:

$$\text{rho} = 1 - \frac{6 \Sigma D^2}{N(N^2 - 1)}$$

(D = difference between ranks; N = number of pairs) is less powerful but does not assume any preliminary condition of the data and is easier to calculate. Unless otherwise specified, "correlation" usually means "coefficient of correlation", which ranges from 0 (showing complete absence of relationship) to 1 (denoting perfect correspondence). It may be either positive or negative so that it ranges from -1 to +1. It is recommended that a statistics manual or a statistician be consulted before using these formulae. See Correlation.

Coefficient of reliability

The coefficient of correlation between two forms of test, between scores on repeated administration of the same test, or between halves of a test, properly corrected. These three coefficients measure somewhat different aspects of reliability. See, for example, the **Kuder-Richardson formula.** 234

Competence

The professional ability required to carry out certain functions. Recognised aptitude to perform a specific act. Competence is a potential which is realised at the moment of performance. 11, 13, 109-111, 125, 133-134, 218, 236, 246, 302, 310, 319, 334-335, 343, 361-363, 409, 411-412, 441, 443, 468, 480.

Completion item

Test question requiring completion of an unfinished sentence or phrase. 428

Concept

A general and abstract mental representation of something; a conceptual model. 102, 202, 236, 302, 304, 308, 310, 333, 343, 353, 357, 359-361, 363, 366, 369, 379, 417, 428, 435, 478, 507.

Continuous evaluation 215-216, 449-452

Contract. See **Programme/contract**

Contrast error 453

Coordinator, qualities of 370

Contributing objective, see Enabling objective.

Correlation

Relationship or "going-togetherness", between two scores or measures. The existence of a high correlation between two variables *does not necessarily indicate that one has any causal influence on the other*. See also **Coefficient of correlation.** 467

Criterion

A standard by which a test may be judged or evaluated; a set of scores, readings, etc., that a test is designed to predict or to correlate with. See Validity. 12-13, 102, 109, 122, 129, 143-144, 149-152, 155-156, 157, 160, 204, 212-213, 221, 234, 238, 334, 336, 358, 362-363, 373, 381, 402, 407, 410, 422, 424-425, 461-463, 472, 479-480, 503, 507

Curriculum See Programme, teaching

D

Defects (Limitations and outside factors affecting tests and examinations) 228-231

Diagnostic evaluation See Formative evaluation

Diagnostic test

In education, a test used to "diagnose", that is to locate, specific areas of weakness or strength and to determine the nature of the weaknesses or deficiencies; it yields measures of the components or sub-parts of some larger body of information or skill. Diagnostic achievement tests are most commonly prepared for assessing skills. See **Formative evaluation**

Diascope See Overhead projector. 345

Difficulty index

The percentage of a specified group of students that answers an item correctly. Also called **Facility index**. 13, 15, 402, 461, 465, 468-471, 476, 480

Discrimination index

The discriminating power of an item. 6, 13, 15, 236, 247, 402, 461, 465, 468-471, 475-476, 480, 503

Distractor

Any of the incorrect choices in a multiple-choice question. 228, 431, 440, 462, 477

Distribution (Frequency distribution) A tabulation of scores from high to low or low to high, showing the number of individuals that obtain each score or fill in each score interval 350-352, 416, 453, 467

E

Education

Action or process of encouraging the formation and development of a person's physical, intellectual and moral faculties. 4, 7, 13, 104-108, 111, 113-116, 123-125, 137, 205, 211, 212, 215, 233, 302, 305-312, 315, 318-319, 341, 363, 369-371, 410, 504, 513

Educational

Directed towards education. Used to qualify the *objectives* defining *student* behaviour. 8, 12-13, 102, 104-108, 117-120, 123-125, 129, 132-133, 135, 137, 143-144, 148, 149-150, 152-160, 163, 202, 205, 216, 223, 233, 238, 243, 305-313, 315, 349, 353, 357-360, 361-364, 369, 377-383, 402-404, 410-411, 419, 424-425, 502, 513-514

Effectiveness

Capacity to produce the desired result. See **Efficiency**. 104, 302, 306-307, 310-312, 408-409, 415, 461, 502, 506, 510

Efficiency

Capacity to produce the desired result *at least cost*. A system that is efficient is preferable to one that is merely effective as there will be no waste of resources. 233, 234, 237, 336, 341, 358-359, 382

Enabling objective 134, 143

Epidiascope 344, 380

Equilibrium (Of an examination). 234, 237

Equivalent form

Any of two or more forms of a test that are closely parallel with respect to the nature of the content, the difficulty of the items included and their discriminating power, and that will yield very similar average scores and measures of variability for a given group. Used for studies or reliability of a test. 450

Error of measurement See Standard error.

Essay question. See also Modified essay question 428-429, 475

Evaluation

Provides the basis for value judgments that make better educational decision-making possible. Includes a "measurement" component and a "judgment and decision" component. 12-13, 104, 106-109, 125, 129, 133, 137-139, 144, 202-209, 211-222, 233, 238-243, 245-246, 307, 310-312, 315, 317, 342, 348, 353, 370-371, 402-406, 409-410, 413-418, 421, 423, 434, 441, 443, 450, 452-453, 461-462, 469, 506, 511, 514, 523-525, 529, 531

Explicit

Stated in a sufficiently clear and precise manner, so as to leave no doubt. ANT: implicit, confused, equivocal, ambiguous, obscure. 111, 139, 150, 163, 246, 334, 353

F

Factor

In mental measurement, a hypothetical trait, ability, or component of ability that underlies and influences performance on two or more tests, and hence causes scores on the test to be correlated. The term "factor" strictly refers to a theoretical variable, derived by a process of factor analysis from a table of interrelationships among tests; but it is also commonly used to denote the psychological interpretation given to the variable – i.e. the mental trait assumed to be represented by the variable, as verbal ability, numerical ability, etc. 133, 230, 234, 336, 351, 368, 411, 453, 475

Factor analysis

A group of statistical methods for analysing the intercorrelations among a set of variables (for example, test scores). Factor analysis uncovers factors which explain the common characteristics of and the differences between the examinees and the questions. Factor analysis has contributed to the understanding of the organisation or components of intelligence, aptitudes and personality, and it has pointed the way to the development of tests of the several components. "Factor" has no causal meaning here; it is used in its mathematical sense and is not intended to express a causal relationship. 475

Feedback

An informative reaction to the message of teaching. It is useful not only as a means of checking but also as a means of increasing the student's learning activity. 216-219, 327, 450-451, 529

Field work 342

Final testing 449-451

Flannelboard (Flannelgraph) 344

Follow-up evaluation See Formative evaluation.

Follow-up test See Post-test

Formative evaluation 12, 108, 202, 215-217, 219, 315, 353, 362, 364, 511

Function, professional

Set of activities (directed towards the same aim) that a person performs to fulfil his role in society. 6, 12, 15, 102, 105, 108, 111, 112, 121-127, 129, 134-135, 243, 307, 331, 333-337, 339, 348-349, 361, 363-364, 367, 377, 385, 404, 405, 411

G

Goal See Aim

Groups, high and low 468-469, 471, 476

H

Halo effect

An interference effect created by the idea the examiner has already formed of a student on the basis of previous test results. 453

I

Incident analysis 109, 441

Indicator, health

Indirect measure of the level of health of the community.

Institutional objectives See Objectives general

Instruction

Process of communicating knowledge and training the mind of a person 113, 346

Integrated learning 355, 361-365

Integrated teaching 355, 359-360

Integration

To join parts together to form a consistent whole. Coordination of different learning/teaching activities with a view to the harmonious functioning of the educational process and more effective training of personnel. See **Integrated teaching and Integrated learning.** 307, 310-311, 313, 408

Intellectual process

Process of thinking in general ideas or concepts; process of using knowledge, interpreting data, solving problems, etc. 136-140, 227, 402, 435

Interpretation of data 138-139, 227, 435

Interval testing 450-451

Item

A single question or exercise in a test. 236, 465

Item analysis See Question analysis.

K

Knowledge 9, 12, 102, 105, 109, 111, 133, 135-138, 143, 155, 157, 160, 212, 229, 231, 306-309, 318, 321, 335, 351, 362, 370, 379, 427, 432, 450, 527, 528

Kuder-Richardson formula

Formula for estimating the reliability of a test from information about the individual items in the test, or from the mean score, standard deviation, and number of items in the test. Because the Kuder-Richardson formula permits estimation of reliability from a single administration of a test, without it being necessary to divide the test into halves, its use has become common in test development. It is not appropriate for estimating the reliability of speed tests. The Kuder-Richardson formula (No. 21) is as follows:

$$r^{tt} = \frac{k}{k-1}\left(\frac{1-\bar{M}\,(k-\bar{M})}{kS^2}\right)$$

k = number of questions in test

M = arithmetic average of scores obtained by the student

S = standard deviation of scores.

L

Law of effect, Thorndike's 214, 245

Learning 13, 107, 117, 136, 139, 157-158, 203, 212, 214-216, 302, 306-310, 313, 318, 324-334, 341-349, 353, 360-362, 363, 365, 379-382, 409, 412, 416-417

Lecture

A lesson given orally by a teacher, with virtually no student participation. It could be, and often is, distributed in printed form. This lack of real participation is the main characteristic of the lecture ***in its traditional form.*** 160, 336, 341, 342, 358, 382

Leniency, errors of 453

Logical error 453

M

MCQ See Multiple-choice question.

Machine-scorable (machine-scored) test

A test which may be scored by means of a machine. In taking tests that are to be scored by machine the examinee records his answers on separate answer sheets. The machine rapidly distinguishes between right and wrong answers and can combine groups of responses in order to yield total or part scores or carry out an item analysis with difficulty and discrimination indices. – 442

Matching item

Type of multiple-choice item calling for the correct association of data given in one list with those given in a second list. There are several types: simple matching, excluded term matching, causal relationship, quantitative comparison, relative variation. 432-433

Media, teaching 341-347

Modified essay question 12-13, 15, 202, 227, 402, 421, 428, 429-430, 450

Motivation

The conscious and unconscious forces that determine behaviour (independently of any moral consideration). 135, 214, 218, 307, 309, 311, 327, 348, 379, 502

Multiple-choice question (MCQ)

A test item in which the examinee's task is to choose the correct or best answer from several given answers or options (distractors). 12-13, 15, 202, 227-228, 402, 421, 428, 431-434, 441-443, 450, 462-463, 477

Multiple response items

Type of multiple choice question in which two or more of the given choices may be correct and where there is generally a code permitting only one answer to be given on the answer sheet. – 432

N

N – The symbol commonly used to represent the number of cases in a distribution, study, etc. 241, 349, 468

Non-directive method

Teaching method whereby the teacher gives no direction but adopts an attitude which encourages students asking for advice to work out solutions to their problems themselves. 318

Norm-referenced tests See Relative criteria tests.

O

Objective, educational 8, 12-13, 15, 101-102, 104, 106-108, 110-111, 117-122, 123-125, 129, 132-133, 135, 137-139, 143-144, 148-150, 152-161, 163, 202, 204, 207-208, 211, 215-216, 220, 223, 225-226, 233, 238, 243, 245, 302, 305-308, 311, 315, 317, 334, 341-342, 348-349, 357, 359, 362-364, 367-369, 373, 380-383, 402-404, 410-414, 421, 422, 450, 461, 463-464, 514

Objective, learning 117, 157, 333-334

Objective, specific – 12, 102, 118-119, 129, 135, 143-144, 149-150, 152, 154-156, 160, 163, 202, 204, 241, 348-349, 357-358, 369, 416, 503

Objective, teaching 117

Objective test

A test in the scoring of which there is no possibility of differences of opinion among scorers as to whether responses are to be scored right or wrong. It is contrasted with tests such as the *traditional* essay examination to which different scorers may assign different scores, ratings or grades. Examples: MCQ, programmed examination, restricted response test. See these terms.

Objectives, general 12, 102, 123, 157, 241

Objectives, institutional See Objectives, general.

Objectives, intermediate 118-119, 124-125, 129, 241, 348, 366, 404

Objectivity 12, 163, 202, 230-231, 233-238, 246-247, 452, 503

Observational rating scale See Scale.

Obstacles to change 302, 375

Oral examination 222, 427

Organisational diagram

A diagram or chart showing the structure of a complex organisation, representing its various components and the relationships between them. The organisational diagram shows the place and responsibilities of each department or section. 12, 108, 202, 241, 374

Overhead projector

An apparatus for projecting images from transparencies onto a screen so that they are visible in ordinary daylight. Also called Diascope. 345, 347, 516

P

Performance

Accomplishment of an act (task) by a person. It is not used in the Handbook in the sense of establishing a record. Individual result obtained in carrying out a task, depending largely on aptitude and motivation. Level of performance = degree of individual success. 13, 108, 110, 134, 143-144, 150, 154, 157, 204, 214, 221, 225, 230, 233, 246, 333, 337, 363-364, 402, 404, 409, 421, 425, 429-430, 461-464, 469, 480, 503

Post-test (follow up test) 449-452, 511, 529

Practicability (Of a test) 225, 233-235, 440

Practical tests 421-422

Practical work 342

Practice effect

The influence of previous experience with a test on a later administration of the same test or a similar test. Usually there is an increase in the score on the second testing, attributed to increased familiarity with the directions, kinds of question, etc. Practice effect is greater when the interval between testings is short, when the materials in the two tests are very similar, and when the initial test is a relatively novel experience for the subjects. 416

Pre-final feedback comprehensive testing 449-451

Prerequisite level test

In education, a test that measures the extent to which an individual has acquired a certain level of competence needed to undertake some new learning activity successfully. For example, a prerequisite level test in pharmcology shows the extent to which a student has reached a level whereby he may profitably begin a course on therapeutics. Also called readiness test. 144

Pre-test

Test which shows to what extent a student has acquired certain competences (knowledge and skills) expected from a course before the commencement of the corresponding teaching. 9-10, 449-451

Problem-solving 13, 130-131, 137-139, 214, 227, 247, 306-311, 319, 335, 382, 402, 412, 436, 439, 441, 478

Programme, teaching

Plan worked out in advance fixing the order or the timetable of a group of specified educational activities. 13, 104, 106, 108, 111, 117, 133, 204, 208, 213, 302-303, 306, 313-317, 324, 361, 368-369, 371, 373-374, 382-383, 385, 402, 405-409, 413

Programme/contract 363

Programme preparation (For educational workshop). 519-522

Programmed examination 13, 15, 402, 421, 441-448, 478

Programmed teaching

Method of instruction consisting of a system of graduated questions with an immediate check of the answer; the right answer is needed in order to answer the following question correctly. Such teaching can be automated by using, for example, teaching machines or computers. 341, 343, 383, 441-448

Project 222, 421-422

Prospective (Studies) – concerning the future; research on the future evolution of mankind; predictions on future conditions – 110, 133, 315

Proximity error 453

Psychomotor See Skill

Q

Question (or item) analysis

The process of evaluating a single test item by any of several methods, in particular by determining its difficulty index, discrimination index and often its correlation with some selected criteria. 13, 402, 465-473

Question analysis card 473

Question bank 473

Questionnaire (For evaluation of workshop) 415, 525-531

R

Random sample

A sample of the members of a population drawn in such a way that every member of the population has an equal chance of being included. This method precludes any bias or selection. The purpose of using the method is, of course, to obtain a fairly "representative" sample of the total population, so that the sample findings may be generalised to the whole population. Random sampling has also the following advantage: in accordance with the calculus of probabilities, formulae are available for predicting the relative frequencies or parameters, such as the mean or standard deviation of the sample from the true values of the relative frequencies or parameters in the total population; conversely, the limits within which are very probably situated the relative frequencies or parameters of the population from which the sample is drawn can be estimated from the, relative frequencies or parameters observed within the sample. There are various methods, in particular ***random number tables***, for drawing such a sample in practice. 349-350

Range

The difference between lowest and highest scores obtained in a test administered to a given group. 467

Rank-ordering

The process of arranging students in order of merit as determined by scores obtained in one or more tests. 245, 265, 467-468, 471-472

Raw score

The first quantitative result obtained in scoring a test (for example, the number of right answers, number of errors, or similar, direct, unconverted, uninterpreted measures). 465-467

Recall item

An item that requires the examinee to supply the correct answer from memory. This item differs from the recognition item in which he need only identify the correct answer. For example, "Claude Bernard published the 'Introduction to the Study of Experimental Medicine' in . . . . . ?" is a recall item, whereas "Claude Bernard published the 'Introduction to the Study of Experimental Medicine' in (a) 1785, (b) 1815, (c) 1865, (d) 1905" is a recognition item in the form of a multiple-choice question. 13, 402, 428, 435

Relative criteria test 13, 461-465, 472, 479

Relevance

Quality of being perfectly appropriate to the object pursued. In the context of the Handbook, the extent to which training programmes correspond to the health problems of the community and the resources available. 12-13, 15, 102, 111, 129, 133, 143, 148, 153, 163, 202, 225, 234, 236-237, 239, 247, 302, 353, 358, 361, 373, 385, 428, 452, 526

Reliability

The extent to which a test is consistent in measuring whatever it has to measure; dependability, stability, and relative freedom from errors of measurement. Reliability is usually estimated by some form of correlation coefficient (see **Coefficient of reliability, Standard error**). 12, 202, 231, 233-237, 247, 452, 475, 478

Representative sample

A sample that corresponds to or matches the population of which it is a sample with respect to characteristics important for the purposes of the investigation. 110

Restricted response test See Modified essay question.

Role, professional

The functions fulfilled by a person. 134

Role, teacher's 13, 333-337, 341

S

Safety evaluation 451

Scale

Continuous series of programmed values in which data are situated in order to assess them with respect to a whole. Also called Observational rating scale. 143, 222, 415-418, 421-425, 452-453

Score See Raw score.

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Skill, professional

Can be an intellectual skill (cognitive domain), a communication skill (affective domain) or a practical skill (sensorimotor or psychomotor domain, referring simultaneously to sensitivity, sensation and motricity). 12-13, 102, 109-111, 134-141, 143-144,154-156, 158, 163, 221-222, 230, 305-312, 321, 324–325, 353, 361-366, 402, 408-409, 412, 422-423, 459

Slides 345, 348, 380

Spearman-Brown formula

A formula giving the relationship between the reliability of a test and its length.

This formula

$$r^{tt} = \frac{2r}{r + 1}$$

r^{tt} = coefficient of reliability

r = coefficient of correlation between the two halves of the test

permits estimation of the reliability of a test lengthened or shortened by any amount, from the known reliability of a test of specified length. Its most common application is in the estimation of reliability of an entire test from the correlation between the two halves of the test (split-half reliability).

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Standard error

The standard error is the standard deviation of a ***sampling distribution***. The use of the standard error is very important when the sampling distribution follows the normal distribution law (i.e. when the sample is drawn at random and is sufficiently large: for example, $n > 30$ in the case of the sampling distribution of a mean).

Its formula is as follows:

$$E = S\sqrt{1 - r^{tt}}$$

E = standard error

S = standard deviation

r^{tt} = coefficient of reliability

See **Kuder-Richardson formula.**

Summative evaluation See **Certifying evaluation.**

Supervision

Guidance and monitoring of activities of health personnel to ensure an acceptable level of performance. 108, 134

System

A coherent group of interacting abstractions and components forming both a theoretical structure and practical method. Sub-system: part of a system. 108

Systematic approach

Theory highlighting the interdependence of the components of something seen as a whole; approaching the elements of a problem by considering them as an interdependent whole 371, 502-503, 528

Systems analysis

Process of studying an activity by mathematical means in order to define its goals and purposes and to discover ways of accomplishing it more efficiently; a constructive method in three phases: collection of data, analysis, and synthesis leading to solving of problems. 110, 233, 371

T

Task, professional.

A specific piece of work that has to be done. 6, 8, 12, 102, 105-108, 110-111, 117-120, 134-136, 141, 143, 149-150, 152, 154-156, 158, 160, 227, 240, 306-307, 314-317, 333, 353, 361-364, 366, 385, 405-406, 408-409, 425-426, 450, 461, 480, 510

Task analysis 109-111, 307

Taxonomy

Classification into categories according to a given system. See **Classification.**

Teaching

Helping a person to know how to act, think or feel. 6, 12-13, 105, 107-108, 117, 125, 127, 133, 136-137, 139, 144, 146, 157, 163, 202, 212, 219, 246, 302, 306, 313, 315, 317, 318-323, 333-337, 341-347, 357-360, 362-363, 367-372, 381-383, 385, 402, 408-413, 415, 441, 502-503, 533

Teaching methods

All the means applied in a rational manner to produce a specified educational result. 13, 108, 133, 139, 157, 228, 302, 341, 340-347, 353, 355, 357-358, 369, 373, 381-382, 533

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Test

Exercise, examination or work on the basis of which a judgment can be made as to a student's intellectual, practical or communication skills. 9, 12-13, 202, 225-231, 233, 240-241, 247, 311, 363-364, 373, 402, 421-422, 425-426, 434, 441-444, 449-452, 461-465, 511, 529

Test(s) (Advantages and limitations of different types of test). See **Defects.**

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Transparency

Sheet of transparent cellulose or acetate film (thermosensitive or otherwise) which can be written or drawn upon. The image can then be projected onto a screen by an overhead projector without darkening the room.– 345, 347, 516

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3. Educational objectives.
4. Programme planning.
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[1] Note, however, that many of these references concern several fields.

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